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#1 Guide To Atari ST

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- Pogo
- File Search Utility
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Special Programming Issue

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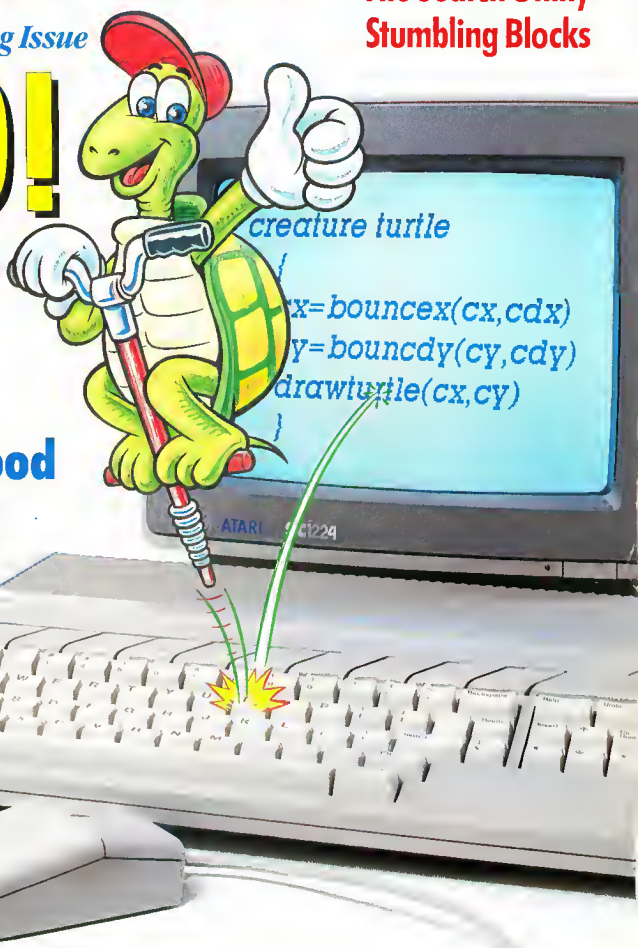

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Editorial

Somewhere along the line, programming got a bad reputation. If you've never tried it, chances are you think programming is impossibly complex, excruciatingly boring or both. Well, we think one look at the picture of a bouncing turtle on this issue's cover blows those notions out of the water. Programming is *not* boring, nor is it a black art practiced only by a small corps of experts. It's a creative process, one that can turn an abstract idea into a dancing turtle. If you've never tried your hand at writing a computer program, give it a shot – it's a no less rewarding hobby than carpentry, R/C modeling or needlepoint.

One of the themes that came up again and again during the planning of this programming issue is that the Atari ST's intuitive mouse-and-menu interface was not a happy accident. It was the result of years of research that began at Xerox PARC and was brought to the public by the Apple Macintosh in 1984. However, interface design is still evolving, and the challenge to software developers today is to optimize the sophisticated user's environment. One way to do this is to study the ideas that made the window environment so successful. Our lead feature this issue, **Secrets of a Good User Interface**, explores this theme. In it, Joseph Ferrari, Tim Oren and Jim Kent explore this topic from three different perspectives, and provide insightful reading for developers and non-developers alike.

The tools of programming are the languages the programmer uses to get a set of instructions into the machine. The wealth of languages for the ST can be overwhelming to the beginner, or even to the intermediate or advanced programmer who is looking for a new development tool. Charles Jackson's article, **Tools of the Trade**, examines computer languages one by one, giving the benefits and drawbacks of each. This invaluable reference will tell you which languages are best for which programming problems.

Finally, we find ourselves back with our friendly turtle. What began as an exercise in animating Logo-style graphics evolved into a full-fledged programming language that incorporates the leading edge of software development – object-oriented programming. Jim Kent's **Pogo** is an ideal tool for video games, animation and simulations. But don't take our word for it; run the Pogo demos on this issue's disk, and then say that programming is boring.

We hope you enjoy this issue. In addition to our programming features, we have, of course, START's usual selection of programs on disk, reviews and columns – including a special Cyber Corner tutorial by Dann Parks and **Stumbling Blocks**, a new game by Mark Annetts. ■

Heidi Brumbaugh
START Programs Editor

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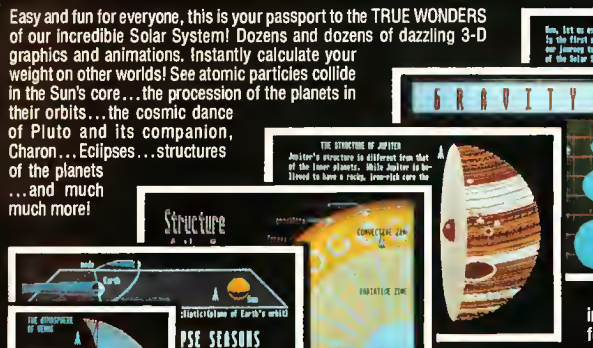

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CIRCLE 083 ON READER SERVICE CARD

Color monitor and 1 MEG RAM required. (512 K version available June 15, 1989.) Not copy-protected.

Dialog Box

Letters From Our Readers

ST Writer Fan

I love ST Writer Elite 3.0 (START, April 1989)! I think it's great to be able to include all the functions of my printer in a single line without creating a new printer driver, like I have to for Word Writer. I'd never before used my printer's elite or elongated styles, because I'd never been able to do so—until now. Let me also thank you for publishing the START Selector and PUTmaker.

J.D. Falk
Silver Spring, MD

C Column Request

I enjoy your magazine very much. It is far and away the best ST-devoted magazine I have come across. I read the "Programming in BASIC" column regularly and have found the tips very useful. I have, however, purchased Laser C and would find a column on programming in C very useful or, as another reader suggested, a column for those making the transition from BASIC to C. Any plans for something like this?

Sam Heath
Vancouver, BC

Yes! START recognizes the popularity of C and definitely has a column in the works. Watch for it soon.—START Editor.

MusiCode Plug

I own an Atari 1040ST and a Yamaha TX81Z synthesizer. Recently, I bought a TX81Z/DX11 Voice Development System from MusiCode. It's wonderful. The displays are handsomely and logically presented; the manual is understandable and thorough. The user interface is especially well-designed, letting you change parameters on the TX81Z and access all programming features with remarkable ease. Mouse operations are complimented by numerous simple keyboard equivalents. The program also includes several special features (a randomizer, a MIDI-file-compatible sequencer, enhanced chord effects, a built-in librarian and a "performance auto-load" feature that automatically loads voices, micro tune and effects data with a selected performance).

For the reasonable price of $99, this program packs quite a punch! The developers at MusiCode have obviously spent a great deal of time and effort figuring how to best serve the TX/DX user. I think their product is a fine example of ST programming at its best.

Gary Pisher
Rochester, NY

pc-ditto II Questions

I recently read David Plotkin's article on pc-ditto II in the May (1989) issue and I have some questions. First, exactly what graphics modes on the IBM PC does pc-ditto II support? When I see IBM software, it usually lists more than one graphics mode available. Does this mean that if the package lists a mode emulated on pc-ditto II, it will automatically work? And finally, you mentioned that enhanced IBM graphics modes can't be emulated on the ST. Are there a great many IBM products (games, graphics, CADD) that use enhanced graphics modes? I'm a layman when it comes to IBM software, so I would appreciate any help you could give me.

Matt Harpold
Kent, WA

For those readers who missed David Plotkin's recent report, pc-ditto II is the long-awaited hardware IBM PC emulator for the ST developed by Bill Teal's Avant-Garde Systems. The primary advantage of pc-ditto II over pc-ditto is speed—it's the equivalent of an IBM PC AT. However, it still can't put more colors on the screen than the ST is capable of displaying. pc-ditto II can emulate monochrome and CGA (Color Graphics) modes, but not EGA (Extended Graphics) or PGA (Professional Graphics) modes. Most PC software will run in several modes; check the packages carefully before buying to be sure that a particular piece of software will run in CGA or monochrome. If a program lists, for example, CGA and EGA modes, then it will run under pc-ditto II in the lower resolution of CGA. Recent products, particularly high-end graphics products, are designed to use only EGA or PGA graphics; these will not run under pc-ditto II.

Watch for a review in an upcoming issue.—START Editor.

Monochrome SEURAT

In the March 1989 issue of START, you published an excellent precision drawing program by Sterling K. Webb called

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Dialog Box

continued from page 8

SEURAT. Each time I boot SEURAT, however, it shows up in inverse video on my Atari SM124 monochrome monitor. I have tried resetting the disk without desk accessories and used many combinations of the programs' function calls all to no avail. There must be some way to return to normal video. Have you heard of this problem and could you spare any advice?

Philippe Bleau
Chicoutimi, Quebec

Monochrome users can swap the foreground and background colors SEURAT uses by double-clicking on the left pallette box (this is the white box above the view window on the main screen).—START Editor

Flash! Insights

One of the most informative "comparison" articles you've ever published was Jerry McBride's "A Buyer's Guide to Telecommunications Programs" in the May 1989 issue. Good job, Mr. McBride!

I must admit, however, that I was a little surprised at some of the omissions concerning Flash! As a long time Flash! user I noticed the errors in the START Chart right away and I didn't expect to see any errors concerning an Antic product in an Antic publication. Just to set the record straight I've taken the liberty of correcting them here.

Flash! does have ARC/un-ARC ability. It is accessed from the command line by entering ARC (parameters). Just as with ST-Talk this requires that ARC.TTP be available for the program to use. Enter ARC from the command line.

The program also has a "View File" function. Just enter VIEW (filename) from the command line or press [Alternate]-[V].

Flash! does support CompuServe's Quick B protocol. It will utilize it automatically when prompted by CIS, as long as you are in Vidtex mode.

These are all minor errors to be sure, and considering the poor manual that comes with Flash! I'm not surprised they snuck by McBride and the START editors.

While I have your attention I'd like to let you in on a tip that makes Flash! a little less awkward to use. Instead of having to grab the mouse in order to toggle between terminal and buffer screens I usually just press [Alternate]-[Clr Home]. This is functionally the same as clicking the right mouse button and it doesn't require removing your hands from the keyboard. Try it, I think you'll like it!

Gordon Meyer
DeKalb, Illinois

Thanks very much for the corrections and tips.—START Editor

Special Thanks

Thank you very much for reviewing CADD Level 1 for the Atari in the March issue. We appreciate Mr. Edwards' fair and accurate observations about our product, and that, despite its drawbacks, he still feels it merits recommendation.

Tina D. Eliason
Marketing Communications
Generic Software

ST Writer Bug?

There seems to be a small bug in version 3.0 of ST Writer Elite (START, April 1989). The first few times I chose "Pr Driver," my system crashed. Through trial and error, I discovered that the crash happened when ST Writer was in a non-root directory. After I copied the program and resource files from "E:\STWRITER300" into "D:\" the copy in the "D:\" folder worked just fine.

Francis Pardo
New York City

Thanks for the warning. We'll pass your bug report along to ST Writer guru Bruce Noonan.—START Editor ■

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CIRCLE 018 ON READER SERVICE CARD

News, Notes & Quotes

What's New in the ST World

by Stephen Mortimer, START Contributing Editor,
And The START Staff

pc-ditto II Shipping

In a surprise announcement, Avant-Garde Systems revealed that their new PC-XT emulator, pc-ditto II, will run at a speed equivalent to a 10-megahertz XT clone. Using the Norton SI benchmark, the IBM PC-XT and PS/2 Model 30 have a rating of 1 and 1.8, respectively. In comparison, pc-ditto II has a rating of 3, indicative of superior performance.

According to Avant-Garde partner William Teal, pc-ditto II was developed because with the original software emulation, "the operation of some programs was very slow, and thus very painful to use. We have always been researching ways to increase the performance of pc-ditto, but we felt we should eliminate as many errors as possible before speeding it up. To us, no one would ever trust our product if we had delivered a very fast emulator with severe errors. It would only get you to the crash point quicker. Instead, we decided that the right way to develop this product was to make it error-free, then speed it up. The results of our efforts is pc-ditto II." pc-ditto II supports up to 640K of memory, monochrome and color monitors, the Atari mouse, hard and floppy disk drives and the serial and parallel ports.

Enhancements planned for pc-ditto II include extended memory support, EGA, Atari Laser support and Roland MIDI chip support. The retail price is $299.95. For more information, contact Avant-Garde Systems at 381 Pablo Point Drive, Jacksonville, FL 32225, (904) 221-2904.

Atari Aids Academy Award Winner

Dave Grusin, winner for best original score at this year's Academy Awards ceremony, is an Atari computer user. The jazz composer and musician used a 1040ST to create the score for *The Milagro Beanfield War*. Grusin recently upgraded to a Mega 2 and considers it the third member in his band. "I'm sold on the ST," Grusin said. "With this system, I can take the film home on video and can actually write, record and store music on the ST and then play back what I've recorded with the picture." He also uses an Atari SLM804 laser to print music scores.

Photo by Steve Blackburn

Jazz musician Dave Grusin (far right) refers to his ST as a member of his band. He composed his Oscar-winning musical score for *The Milagro Beanfield War* with his ST. Grusin and fellow musicians Lee Ritenour (left) and Don Grusin (center) use ST's both in studio sessions and on the road.

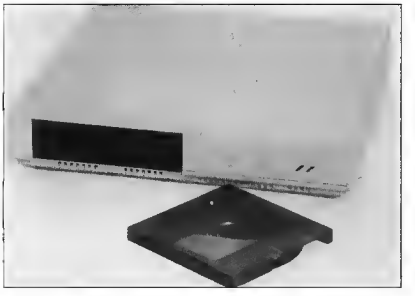
Fat Bits

- Atari has closed 15 stores in the Federated chain of electronic retailers. Headquarters staff was reduced by 30 percent and will be moved to Sunnyvale, California from the present location in Texas. The staff reductions and store closings are part of a restructuring of the company. As of 1989, Atari is considering Federated a discontinued operation so that it will not financially drain Atari. At the World of Atari show in Anaheim in April, Michael Dendo, Vice President of Sales for Atari, announced a "drop-dead" date of June 30, 1989 for the Federated situation.

- Check with your local PBS affiliate this summer for a rerun of show number 619 of *Computer Chronicles*, called "Atari ST Update." ▶

Spring COMDEX Report

by Tom Byron, START Associate Editor



Atari introduced their Megafile 44 at Spring COMDEX in Chicago. This new hard drive has a removable cartridge to multiply hard-disk capacity.

Over 60,000 dealers and developers attended the Spring Computer Dealer's Exposition (COMDEX) trade show held in Chicago's famous McCormick Place, April 10 through 13. Atari's booth was predictably small, but conspicuously placed next to IBM. Twenty-eight third-party developers were on hand to show off the latest in ST software and hardware.

Atari president Sam Tramiel sounded an upbeat note about the future of Atari Corp. in the United States. At a dealer's party held in Atari's suite at the Barclay Hotel, Tramiel cited 1989 as "a year of rebuilding in the U.S."

After mention of Atari wares being shown at COMDEX (see below), Tramiel talked about the new TOS ROMs and the long-awaited 68030-based TT. TOS version 1.4 is available now, but in limited quantity in order to clear out old inventory. The TT, Atari's entry into the 32-bit arena, will be shipping before the end of the year. When pressed for specifics about their new machine, Tramiel kept quiet. Atari did, however, show the TT to developers behind closed doors. The machine is rumored to have a color resolution of 640-by-480 and 206,000 colors in its pallette. It will run both TOS and Unix software, use a VME bus system and support industry standard networking hardware. Keep an eye on future News, Notes & Quotes for more TT info. Tramiel also mentioned another machine being developed by Atari that will be "based on a Motorola chip." He declined further comment.

Atari Highlights

To the predominantly IBM-PC show, the hit of the Atari booth was the glass-encased Portfolio. Formerly known as Folio, Atari's "pocket PC" attracted attention from national newspapers and television. As discussed in the July News, Notes & Quotes, Portfolio is a hand-held computer that is fully MS-DOS (ver. 2.11) compatible. It is scheduled for a July release at a retail price of $399.

For Atari dealers the real star of the show was the Stacy, the ST laptop, also shown under glass. Featuring a double-sided disk drive and one megabyte of internal RAM, the Stacy is a fully functional desktop system. According to Joe Mendolia, head of marketing at Atari, the best way to conceptualize the Stacy is as "the laptop version of a 1040ST with a monochrome monitor." Atari is looking at a June release with a suggested retail price of $1,495. Watch for a review of the Stacy and the Portfolio in a future issue of START.

Atari also showed their DeskSet II, Wordflair, the Megafile 44 removable hard disk and the 80286-based PC4. DeskSet II is Atari's GEM version of DeskSet, a desktop-publishing program that uses CompuGraphic fonts and can be interfaced with CompuGraphic typesetting machines. Wordflair, developed for Atari by Blue Chip Software, is a GDOS-based document processor that integrates spreadsheet, database, charting and word-processing functions. It is scheduled for release in June at a price of $149.95.

COMDEX was the first public viewing of the Megafile 44 in the United States. It is a 44-megabyte removable cartridge hard disk that will sell for under $1,200. Cartridges will be priced at $150.

Not to be left behind in the huge PC market, Atari has developed the PC4, an 8- to 12-mHz clone based on Intel's 80286 microprocessor. The machine is slated for a July release pending FCC approval.

Third-Party Highlights

Genuine LAN for the ST. Biodata from West Germany was on hand to demonstrate its BioNet networking system. It's an incredibly fast system that will support up to 100 machines. Tan Siekmann, president of Biodata, is currently

looking for a U.S. distributor.

DP Computer Specialties was at the Atari booth to display ViewTouch. This new business product requires a special monitor that senses touch. One of ViewTouch's main applications is as a cash register. To "ring up" merchandise, the user simply touches the desired item on the screen and the program automatically makes all calculations. When the transaction is complete, a receipt can be printed out.

COMDEX saw the premiere of Migraph's hand scanner, which lets you add hand-scanned images to all your DTP projects. Migraph is awaiting FCC approval, so no release date has been set.

Taito showed off some new releases for 1989. Plans for the ST are as follows: Bubble Bobble, Operation Wolf and Renegade, April; Sky Shark, May; Qix, June; and Rastan, Fall.

Computer Avenue demonstrated its new hard drive backup program called Mirror Image.

Abacus, publisher of popular books and software for the ST, introduced a new CAD program called BeckerCAD. It should be available by the time you read this.

World of Atari News

by Dan Fruchey

The START booth at the World of Atari show in Anaheim, California. START co-sponsored a MIDI event that featured the Moody Blues and Mick Fleetwood of Fleetwood Mac.

• California Atari enthusiasts got a chance to show support for their favorite computer at the World of Atari show in Anaheim on April 22-23.

• Gadgets By Small gave users a glimpse of Spectre GCR, the new hardware and software combination that lets ST users run Macintosh software directly from Mac format disks on a standard Atari drive. Look for release in August.

• Atari hosted a booth showing Deskset II and an exciting new product called Wordflair, a unique combination of word processor, database, spreadsheet, and desktop publishing program rolled into one. Their hardware lineup included a fully functioning STACY laptop ST which is scheduled for release in July or August.

• On Saturday night Atari gave a show sponsored by ST World, Kawai, START and Keyboard Magazines. The 1,500 attendees got a chance to meet Mick Fleetwood, Michael Pinder and other musicians while seeing the Hotz Instrument in action (see the April and May 1989 issues of START).

• Bill Teal introduced pc-ditto II, a superb update of pc-ditto that is installed internally. The best news is that pc-ditto II achieves AT speed for $299.

• Imagen Corp. showed off the latest version of UltraScript. New drivers now make dot matrix and Hewlett-Packard Deskjet printers Postscript-compatible. (See the review elsewhere in this issue.)

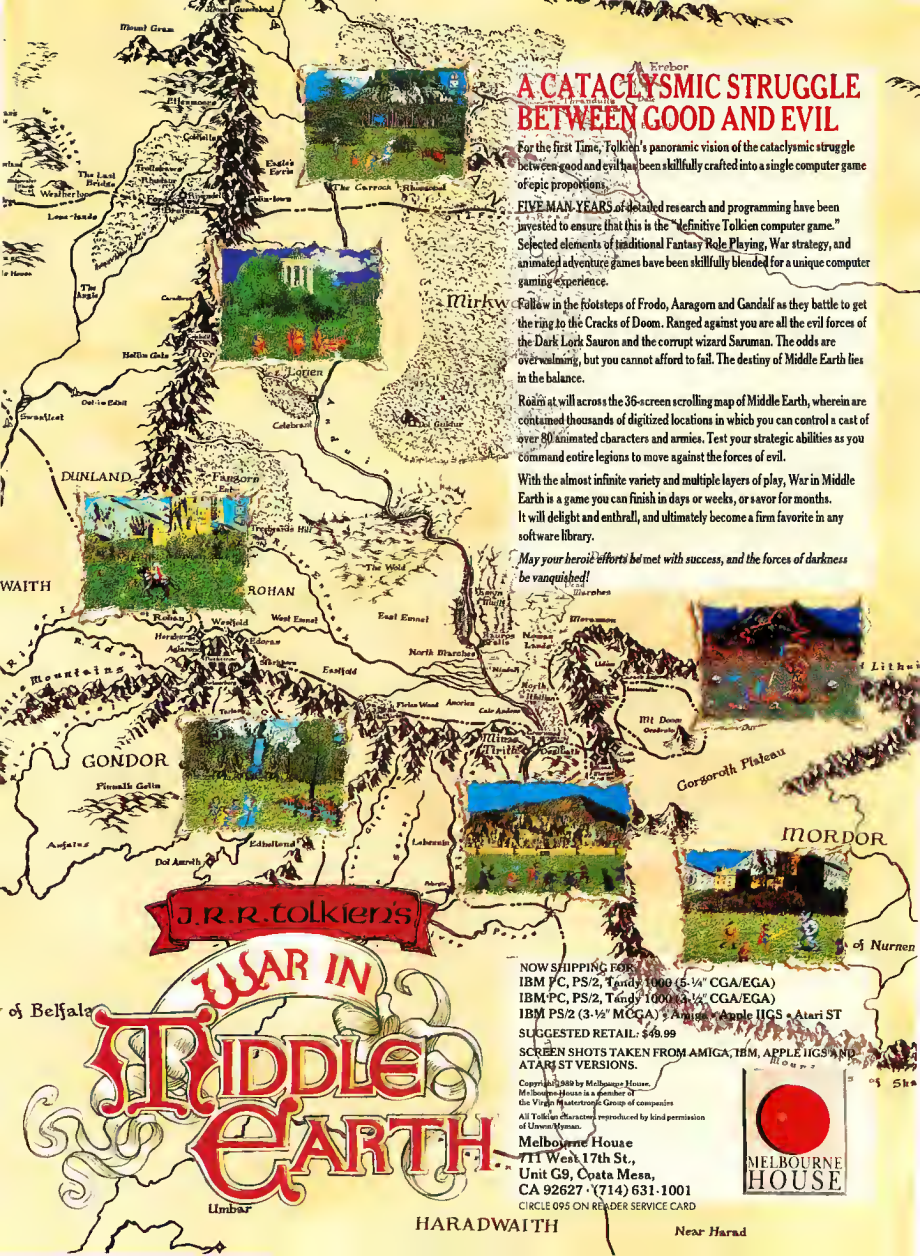
• Keep your eyes open for DVT by Seymor/Radix, a hardware interface that lets you back up your hard disk using a VCR with storage of up to 360 Mb on a standard video tape.

• A conference held by Atari's Sig Hartmann, Joe Mendolia and Mike Dendo gave users a glimpse into Atari's future. The SRO audience was told that in 1989 all new products will reach the U.S. first to support the home market.

• TOS 1.4 programmer Ken Badertscher stated the faster new OS will only be available in a ROM version It is currently in production and should be available in limited quantities shortly.

• Migraph attracted a lot of attention with their new low-cost hand scanner and Touch-Up. The scanner will be available this summer.

• Enthusiasm, exciting new products, and an upbeat approach by Atari made the Anaheim show a resounding success. ■



A CATACLYSMIC STRUGGLE BETWEEN GOOD AND EVIL

For the first Time, Tolkien's panoramic vision of the cataclysmic struggle between good and evil has been skillfully crafted into a single computer game of epic proportions.

FIVE MAN-YEARS of detailed research and programming have been invested to ensure that this is the "definitive Tolkien computer game." Selected elements of traditional Fantasy Role Playing, War strategy, and animated adventure games have been skillfully blended for a unique computer gaming experience.

Follow in the footsteps of Frodo, Aaragorn and Gandalf as they battle to get the ring to the Cracks of Doom. Ranged against you are all the evil forces of the Dark Lord Sauron and the corrupt wizard Saruman. The odds are overwhelming, but you cannot afford to fail. The destiny of Middle Earth lies in the balance.

Roam at will across the 36-screen scrolling map of Middle Earth, wherein are contained thousands of digitized locations in which you can control a cast of over 80 animated characters and armies. Test your strategic abilities as you command entire legions to move against the forces of evil.

With the almost infinite variety and multiple layers of play, War in Middle Earth is a game you can finish in days or weeks, or savor for months. It will delight and enthrall, and ultimately become a firm favorite in any software library.

May your heroic efforts be met with success, and the forces of darkness be vanquished!

J.R.R. tolkien's

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IBM PC, PS/2, Tandy 1000 (3-½" CGA/EGA)
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SUGGESTED RETAIL: $49.99

SCREEN SHOTS TAKEN FROM AMIGA, IBM, APPLE IIGS AND ATARI ST VERSIONS.

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CIRCLE 095 ON READER SERVICE CARD

MELBOURNE HOUSE

Products Update

New ST Software and Hardware

Compiled By Marta Deike
Start Editorial Coordinator

4,096 Colors on the ST

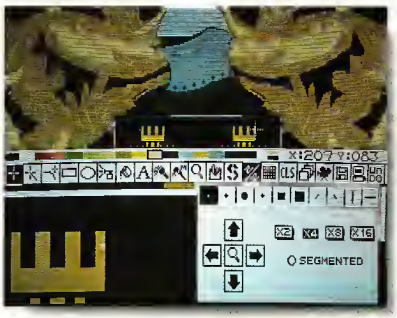
John Russell Innovations (JRI) has created the **ST4096C Board** for the ST. The board expands your color palette from the standard 512 colors to a whopping 4,096! It comes with sample software but will retain compatibility with existing software as well. ST4096C Board, $49.95. **John Russell Innovations, P.O. Box 5277, Pittsburg, CA 94565, (415) 458-9577.**

Mouse Alternative

Best Electronics has produced an alternative mouse for ST users called, appropriately, **The Best Mouse**. This new mouse has been redesigned internally to make it more mechanically sensitive. In order to give you more comfort, it has a new, ergonomic shape. The Best Mouse is compatible with all STs and Megas. The Best Mouse, $49.95. **Best Electronics, 2021 The Alameda, Suite 290, San Jose, CA 95126, (408) 243-6950.**

New Paint Program for the ST

Designed by artists from ArtisTech Development, **Da Vinci** is a graphics tool for drawing, animating and painting. This new draw-and-paint program for the ST includes the standard features of art programs, such as palette, brushes, brush stroke applications, mirror and shading modes. But among Da Vinci's unique features is a "real-time magnify" that works in every mode with every tool. Text options include resizable, proportional and color fonts.



Da Vinci, new paint software for the ST from Aristech, lets you create stunning images and animation. Da Vinci is ideal for programming and animating games.

Once you've finished drawing a picture with Da Vinci, you can bring your creation to life with the Animation Format. Its storage system and compression techniques let you edit up to 12 pictures at once in a 512K system and up to 48 pictures in a one-megabyte machine—ideal for designing and editing games. Da Vinci, $99.95. **ArtisTech Development, P.O. Box 214830, Sacramento, CA 95821, (916) 488-6844.**

HotWire from CodeHead

CodeHead Software has just released **HotWire**, a new "shell" program designed to accelerate any and all processing on your ST. HotWire eliminates the stages of opening windows and finding programs, letting you either auto-start a program at bootup or access any program instantly, regardless of its location, just by pressing a key combination. There are over 400 possible "hot" key combinations. HotWire, $39.95. **CodeHead Software, P.O. Box 74090, Los Angeles, CA 90004, (213) 386-5735.** ▶

SupraDrive

Atari ST Hard Disk Systems

- High performance hard disk drives for Atari ST and Mega ST computers
- DMA and SCSI connectors for daisy-chaining additional devices
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- Includes these useful utilities:
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  - Autobooting directly from the hard disk
- Battery backed-up real-time clock
- Built-in fan

NEW!

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- Battery backed-up real-time clock
- Useful as primary storage and for hard disk backups and archival data storage

NEW!

MegaDrive

Internal Hard Disk System

- 40MB capacity
- Mounts inside the Atari Mega ST case
- High speed DMA data transfer
- Fast RLL drive — 28ms access time
- Leaves DMA and 68000 port free for other peripherals

Available at your local dealer, or call:

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CIRCLE 092 ON READER SERVICE CARD

Products Update

New Games

"Holy high-tech, Batman, we're on the ST!" Yes, Robin, Data East has brought **Batman, The Caped Crusader** from the pages of DC Comics to the ST. In true Bat tradition, you must find and destroy the Penguin's master computer, which has conjured up a mad scheme to rule the world with an army of robot penguins. Meanwhile, the Boy Wonder has been kidnapped by that maniacal prankster, the Joker. There are items hidden all over Gotham City that will help you eventually solve the puzzle. Your challenge, of course, is to find them in time. Batman, The Caped Crusader, $39.95. **Data East, 470 Needles Drive, San Jose, CA 95112, (408) 286-7074.**

MicroProse's popular **Pirates**, is now available for the ST. As a novice seaman, you begin with one ship and a handful of crew members. Through hard work and shrewd bartering (and not just a bit of underhandedness and disregard for personal safety), you gradually gain wealth and status, leading more ships and men. There are over 50 islands and nations to visit and nine different types of ships. You can choose a specific time period in which to play, or even opt to lead famous, historically-documented expeditions such as those of Sir Francis Drake and Henry Morgan. Pirates, $44.95. **MicroProse, 180 Lakefront Drive, Hunt Valley, MD 21030, (301) 771-1151.**

Adapted from Sega's hit arcade game, Mindscape brings you **Indiana Jones and the Temple of Doom**. As the famous adventurer, you must navigate your way through twisting tunnels, across narrow ledges and over fiery chasms—all to free innocent captives and find hidden treasure. Indiana Jones and the Temple of Doom, $49.95. **Mindscape, 3444 Dundee Road, Northbrook, IL 60062, (312) 780-7667.**

A twilight zone of deadly surprises awaits you in the **Dark Side**, a 3D space adventure from Cinemaware. As a one-man army, equipped with lasers, shields and a jet power pack, you must infiltrate a heavily-guarded military outpost and destroy the doomsday weapon before the apocalypse is unleashed. Dark Side, $39.95. **Cinemaware, 4165 Thousand Oaks Blvd., Westlake Village, CA 91362, (805) 495-6515.**

In Mindscape's Batman, The Caped Crusader, your mission is to save Robin from the Joker and stop the Penguin's evil supercomputer from taking over the world. Thrills and spills in the usual "bat" tradition.

Lightning Rod Pad, Screenwipe

Static electricity is one of your computer's major enemies—files can be lost with the touch of a finger. Wipe out the static 4-and the frustration with new products from Wave Pad and Screenwipe.

The **Lightning Rod Pad** protects your computer against static electricity. The Pad is a mouse pad made of a conductive open-cell rubber that absorbs static electricity and then drains it by means of a grounding wire. This wire is attached to the pad itself and connects to the back of your computer. Touch the pad before laying hands on your computer and your system is safeguarded against static electricity. Lightning Rod Pad, $11.95 (Mouse Pad size), prices vary according to size. **Wave Pad, P.O. Box 56117, Hayward, CA 94545-6117, (800) 345-9283.**

Screenwipe is a new anti-static monitor-cleaning cloth from Lensclean. The cloth, a lint-free carrier fabric, is premoistened with a chemical called Concostat G, which dissolves the buildup of dirt, dust, smoke and other gritty substances that are attracted to the screen by static charge. Screenwipe also reduces future buildup by removing the static charge itself. Screenwipe, $22.50 per box of 50 packets. **Lensclean, Inc., 74 Louis Court, Dept. M2, South Hackensack, NJ 07606, (212) 362-3184.** ■

Secrets of a Good User Interface

Revealed By Three Experts

Joseph P. Ferrari, Tim Oren and Jim Kent

This issue START invited three key Atari software figures to address the questions: What makes a good interface? What pitfalls should be avoided? How can a programmer help a user get up and running as easily as possible? Whether you're a programmer or a user, we think you'll find their insights valuable.

Ten Principles of a Good User Interface

by Joseph P. Ferrari

The introduction of the Apple Macintosh in 1984 fundamentally changed how computers are used today. In the pre-Macintosh days, computers were definitely not for everyone—regardless of affordability. Because those early computers were severely limited in memory, speed and storage capacity, the

prevalent method of presentation relied heavily on the skills of the user.

This article discusses the 10 principles of a good user interface. The word "good" in this context refers to a principle that increases productivity, since this is the primary purpose of computers.

1. Be Consistent

Since a particular program will be only one of many that the consumer will use, the user interface should reflect the prevailing standards. Most software programs have operations common to each other—for example, cut, copy and paste. When these options are always placed under the same drop-down menu, for example, Edit, the user can achieve an acceptable level of productivity quickly without first struggling to learn the fundamentals.

Adhering to a common standard also helps to avoid user frustration. Assume, for example, that Control-X is commonly used for cut-and-paste functions; if a new program uses Control-X to exit without saving work, it will cause users unnecessary hardship and frustration. If a user encounters enough of these frustrations he or she will eventually turn to an alternative.

2. Reduce the Workload

Operations should be achieved with a minimum of user activity. Too much "mousing around" means less time spent doing real work. For example, features that require a stream of menu options and parameter settings to perform a single operation are clumsy.

You can reduce the user's workload by building intelligence into the application. For example, in a word processing program, the spell-checking function should not require the user to enter the dictionary path each time it's used. The program should have been set up intelligently so that each time the spell checker is used, the program doesn't request the same information.

3. Reduce the Skill Required

Making your program accessible to the largest number of users is inextricably linked to the degree of skill a user needs to operate it productively. The first area to consider is the user's learning process. In many cases, the user faces multiple problems when learning to use a new application:

A. The user must come to terms with how the program's functions are represented in computer actions. For example, many of the basic functions in a paint program are presented as a palette of icons representing graphic tools; in the user's mind, the toolbox metaphor reinforces the idea that in order to *apply* a function, it must first be *selected*.

Joseph Ferrari was the Director of Software Development for Atari Canada; after that, he directed software development for Atari Corp. U.S., where his efforts were focused on developing the Mega/Laser Printer combination as a desktop publishing workstation. He is now back in Toronto where his new company, Personal Productions Limited, develops interactive multimedia productions. Joseph says that because the general public tends to be intimidated by computers, user interface design is the number one priority for acceptance in the multimedia market.

B. The user may be unfamiliar with the application in *any* form, computerized or conventional, and thus faces the task of understanding its concepts while at the same time using the software to perform some specific function. In the learning stages, the use of common metaphors for operations, such as the file drawer or trash can icon on the Desktop, can provide considerable reinforcement and help the user achieve a deeper understanding of the application.

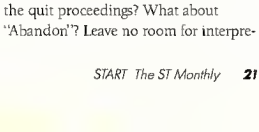
One of the most important and effective means of reducing the skill required is to provide the user with visual choices. Let the user select from a panel of options by pointing and clicking and eliminate the need to memorize the available options.

4. Communicate

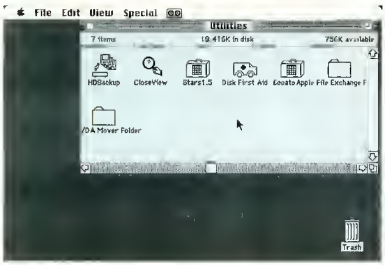
Keeping the user informed at all times is a vital component of sustaining or increasing the user's productivity. There are three simple rules that should be followed:

A. During long operations, provide continuous or regular progress reports. However, the time when you need to communicate the most information with the greatest accuracy is during operations that have gone wrong. When an error occurs, you want to help the user recover from that error and restore normal operations.

B. Present the available options in a clear and concise manner; leave no room for ambiguity. As an example, the user has selected the Quit option and the following alert message is displayed:



Does "Continue" mean to continue with the application or continue with the quit proceedings? What about "Abandon"? Leave no room for interpre- ▶



The Apple Macintosh spearheaded the mouse-and-menu interface—familiar images now but quite revolutionary in 1984 when the Mac was introduced.

tation; keep messages simple and explicit.

C. Provide immediate feedback, both by acknowledging the user's action (in the case of selecting an icon, the standard feedback is to highlight the icon) and by letting the user know whether or not the operation can be started.

5. Make What You See What You Get

In a what-you-see-is-what-you-get (WYSIWYG) environment the user always has a good estimation of the final form of the document and doesn't need to constantly invoke a preview mode. A WYSIWYG environment usually shields the user from unnecessary information; if text is to be in bold, it should show on the screen as bold rather than displaying a scheme of codes.

6. Allow for User-Configurable Preferences

Since a program or environment must cope with varying degrees of user proficiency, the product must accommodate the novice as well as the expert and be able to mold various program characteristics to the user's preference or level of expertise.

7. Provide a Stable Environment

Providing a stable menu bar or environment will keep the user in a familiar atmosphere that makes learning easier. This does not mean that a dynamic menu bar cannot be employed successfully, such as in a multi-application environment where there are clear distinctions between aspects of the program, as in an integrated word processor, spreadsheet and database program. The changes would then assist the user by alerting him or her that the program is entering one of the other fundamental modes.

Graying out the unavailable options in drop-down menus or dialog boxes is also effective for maintaining a stable environment while limiting options.

8. Forgive the User's Errors

An extensive undo function adds significantly to the user's confidence to experiment and make changes. If the user does something that can't be undone, an alert message should warn the user that the changes are irreversible.

9. Provide Keyboard Equivalents

Drop-down menus are an excellent means of introducing the user to an application, but eventually the user will become proficient in specific areas of the program; at this point, keyboard equivalents help the user's productivity rise even more. Keyboard equivalents can also be used as shortcuts to commands that normally would require several menu selections.

10. Maintain Aesthetic Integrity

Screen layout design should not be designed to dazzle or impress the user; rather, the guiding motive should be honest to the principle of effective communications. Simplicity is the key to clarity.

Another principle to observe is to avoid overloading the user with too much data in a screen layout; you don't want to fill every pixel on the screen. If the pertinent data cannot fit comfortably in one screen panel then divide it logically and use as many screens as required.

Summary

One main reason that the Macintosh has become a second standard in corporate America is its user interface—and the fact that most of the software developers have adopted the interface to a significant extent. ST software developers will need to do the same to increase its future chances.

Ergonomics—The Human Factor

by Tim Oren

(This article was excerpted from Antic Online's Professional GEM column.)

A reader of a novel or science fiction story must suspend disbelief to participate in the story. If the author's grammar or plot is clumsy, it jars the reader and breaks down the illusion, pulling the reader out of the story. Similarly, a software designer who fails to pay attention to the speed and consistency of a program's interface will distract users from the program's functions and detract from the care that has been lavished on the function of the program.

Making an interface fast and usable is often treated as a black art. It isn't—there are well-known methods derived from the field of ergonomics, the study of interaction between man and machine. The ergonomics of the human computer interface were studied exten-

sively at Xerox PARC, the birthplace of the Alto, Star and Smalltalk systems which led to the Macintosh and the Atari ST. The designers of those original systems knew and applied the principles of *ergonomics*.

What follows is a short venture into the world of ergonomics. You'll find more than the usual quota of math, salted with examples of real design problems. But there's no way print can convey the vibrancy and tactile pleasure of a good interface, or the sullen boredom of a bad one. The best way to make ergonomics real is to look for your own examples. Get out your favorite arcade game and see if you can spot some of these principles in action. Dig out the most annoying program in your reject pile and look for the mistakes. Then look at your own work with a critical eye.

Fingertips

We'll start right at the user's fingers with the basic equation governing positioning of the mouse, Fitt's Law:

```
T = I * LOG2( D / S + .5)
```

where T is the amount of time to move to a target, D is the distance of the target from the current position, and S is the size of the target, stated in equivalent units. LOG2 is the base 2 (binary) logarithm function, and I is a proportionality constant, about 100 milliseconds per bit, which corresponds to the human's "clock rate" for making incremental movements.

We can squeeze an amazing amount of information out of this formula when attempting to speed up an interface. Since motion time goes up with distance, we should arrange the screen with the usual working area near the center, so the mouse will have to move a smaller distance on average from a selected object to a menu or panel. Likewise, any items which are usually used together should be placed together.

The most common operations will have the greater impact on speed, so they should be closest to the working area and perhaps larger than other icons or menu entries. If you want to have all other operations take about the same time, then the targets farthest from the working area should be larger, and those closer may be proportionately smaller.

Tim Oren was a member of the original GEM team at Digital Research and designed the GEM Resource Construction Set, later ported to the Atari ST. After leaving DRI, he designed the GEM version of KnowledgeSet's Graphic Knowledge Retrieval System, one of the first hypertext systems available for CD-ROM. At the same time, he was the author of the Professional GEM series of online columns in Antic Online and a contributor to the inaugural issues of START. Tim is currently employed by Apple Computer's Advanced Technology Group, where he leads a project in multimedia information retrieval.

Consider also the implications for dialogs. Small check boxes are out. Large buttons which are easy to hit are in. There should be ample space between selectable items to allow for positioning error. Dangerous options should be widely separated from common selections.

Muscles

If you have used the ST Desktop for any period of time you've probably noticed that your fingers now know where to find the File menu. This phenomenon is sometimes called "muscle memory," and its rate of onset is given by the Power Law of Practice:

$$T(n) = T(1) * n^{-a}$$

where T(n) is the time on the nth trial, T(1) is the time on the first trial, and a is approximately 0.4.

This first thing to note about the Power Law is that it only works if a target stays in the same place! This should be a potent argument against rearranging icons, menus, or dialogs without some explicit request by the user. The time to hit a target which moves around arbitrarily will always be T(1)!

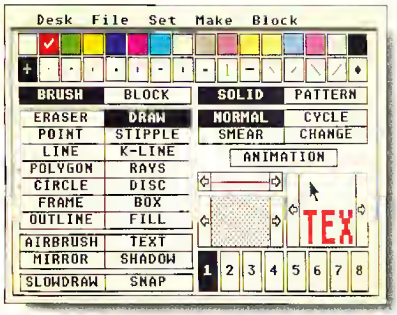
Eyes

Just as fingers are the way the user sends data to the computer, so the eyes are the channel from the machine. The rate at which information may be passed to the user is determined by the "cycle time" of the user's visual processor. Experimental results show that this time ranges between 50 and 200 milliseconds.

Events separated by 50 milliseconds or less are always perceived as a single event. Those separated by more than 200 milliseconds are always seen as separate.

Suppose your application's interface contains an icon which should be inverted when the mouse passes over it. We now know that flipping it within one-twentieth of a second is necessary and sufficient. Therefore, if a "first cut" at the program achieves this performance, there is no need for further optimization, unless you want to interleave other operations. If it falls short, it will be necessary to do some assembly coding to achieve a smooth feel.

On the other hand, two actions which you want to appear distinct or ▸



DEGAS Elite's main screen demonstrates Tim Oren's description of "chunking," an effective way to optimize the user's short-term memory by grouping several related items. All filled drawing options are in one column; non-filled options are in another column.

convey two different pieces of information must be separated by an absolute minimum of a fifth of a second, even assuming that they occur in an identical location on which the user's attention is already focused.

It should be quickly added that stimulus enhancement will only work when it unambiguously draws attention to the target. Three or four blinking objects scattered around the screen are confusing, and worse than no enhancement at all!

Short-Term Memory

Both the information gathered by the eyes and movement commands on their way to the hand pass through short-term memory (also called working memory). The amount of information which can be held in short-term memory at any one time is limited. You can demonstrate this limit on yourself by attempting to type a sheet of random numbers by looking back and forth from the numbers to the screen. If you are like most people, you will be able to remember between five and nine numbers at a time. So universal is this finding that it is sometimes called "the magic number seven, plus or minus two."

This short-term capacity sets a limit on the number of choices which the user can be expected to grasp at once. It suggests that the number of independent choices in a menu, for instance, should be around seven, and never exceed nine. If this limit is violated, then the user will have to take several glances, with pauses to think, in order to make a choice.

Most people can only remember between five and nine numbers at a time.

Chunking

The effective capacity of short-term memory can be increased when several related items are mentally grouped as a "chunk." A well-designed interface should promote the use of chunking as a strategy by the user. One easy way is to gather together related options in a single place. This is one reason that like commands are grouped into a single menu which is hidden except for its title. If all of the menu options were "in the open," the user would be overwhelmed with dozens of alternatives at once. Instead, a "Show Info" command, for instance, becomes two chunks: pick File menu, then pick Show.

Sometimes the interface can accomplish the chunking for the user. Consider the difference between a slider bar in a GEM program, and a three-digit entry field in a text mode application. Obviously, the GEM user has fewer decisions to make in order to set the associated variable.

References

This article is a modest sampler from a much larger field. The following references will help you dig deeper The Card, Moran and Newell book was the primary source for this article. If you don't have the resources of Silicon Valley, remember that your library can usually order these materials for you

Stuart K. Card, Thomas P. Moran, and Allen Newell, **The Psychology of Human-Computer Interaction,** Lawrence Erlbaum Associates, Hillsdale, New Jersey, 1983. (Fundamental and indispensible. The volume of experimental results make it weighty. The Good Parts are at the beginning and end.)

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J.D. Foley and A. Van Dam, **Fundamentals of Interactive Computer Graphics,** Addisan Wesley, 1984, Chapters 5 and 6. (If you can't get the article abave, read this. If you are designing graphics applications, buy the whale baak! Staggering bibliography.)

Ben Shneiderman, **"Direct Manipulatian: A Step Beyond Programming Languages," IEEE Camputer,** August 1983, pp. 57-69. (What da Pac-Man and Visicalc have in cammon? Shneiderman's analysis is vital to creating hat interfaces.)

Oren, Tim, **"Professianal GEM,"** Antic Online, CampuServe. (The complete text of this article and several others on the same topic are included in Tim's Prafessional GEM column in the Index section of Antic Online. Log anta CampuServe and type GO ANTIC.)

The Perils of Decent Human Interface

by Jim Kent
START Contributing Editor

My first commercial program, the MicroIllustrator, was a paint system written in 6809 assembly language for the Tandy Color Computer. I was very pleased with myself when I managed to squeeze the flood fills, rectangles, circles, lines, text, brushes, patterns and other graphic elements into about 3K of code in a month's work. All done, I said to myself—except for the user interface.

The MicroIllustrator interface was not that much by today's standards: no drop-down menus or overlapping windows. But we did have a cursor following the mouse, icons that would be highlighted when you clicked on them and a couple of different menu screens. I was more than a little shocked when it took another two months of work and 6K of code to implement it.

Now I have a text editor that does block copies, a C compiler to figure out what to put in what register and hundreds of libraries of functions I've built up over the years. It's not unusual to generate 3K of code in a day. However, one thing *has* remained constant: it always seems to take at least twice as long to build the interface as the rest of the program.

Pleasing All the People . . .

Different people like to control their computers in different ways. Some people like the keyboard, some like to see their choices spelled out in drop-down menus. Some people find drop-downs too slow and would rather make a quick click somewhere on the screen and have something happen. So to keep everybody happy you need to have three ways to do everything.

Keyboard commands work best if they are easy to remember. Spelling out the keyboard equivalents next to their corresponding option on drop-down menus certainly helps. It's also good to make the key the same as the starting letter of the drop-down command. Sadly, nearly half the words in the English language start with S, T, R, N or C. As Jack Powell, former Antic Software Product Manager, says: "Thank God for Word Perfect's Thesaurus!" Unless a program is a word processor, it should not use the {Control}, {Alternate} or {Shift} keys as part of the keyboard commands; it's hard to press {Alternate P} with one hand, and many people like to keep one hand on the mouse.

Jim Kent is a professional graphics programmer living in San Francisco. He wrote his first commercial programs, the MicroIllustrator for the Coco and Aegis Animator for the Amiga, while employed at Island Graphics. Since then, Jim has started his own company and written Aegis Animator and Cyber Paint for the Atari ST and Zoetrope for the Amiga. He's also had numerous programs published in START, including Flicker (Summer 1987), the Audio Visual Sequencer (November 1988) and the computer animation programming language Pogo in this issue.

Drop-down menus force you to spell out exactly what a command does in two words or less, and sometimes it's very hard to come up with a meaningful name. My suggestion—at all costs avoid using the words get, put, push, pop and buffer. These words tend to mean more to a programmer than to someone who's not, and also have different interpretations in computerese.

Selecting from a drop-down menu involves three steps: moving the mouse to the top of the screen, finding the drop-down that contains the item you want and clicking the mouse over a rather narrow strip to select it. If you can organize the drop-downs into logical groups and place the most commonly used items near the top or the bottom, the process goes faster.

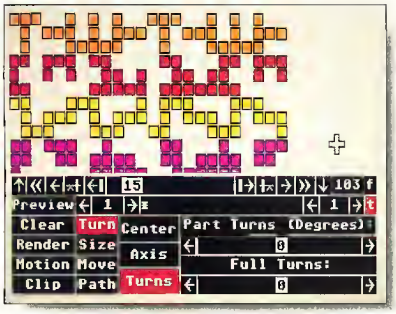
The third component of a user interface is the panel menu—the area on the screen where a single mouse click tells the computer to do something. I usually put these at the bottom of the screen out of respect for the Quantel Paintbox, a hardware/software combination used by production companies which has one of the nicest interfaces I've ever seen.

From a programming standpoint, panel menus are the most labor-intensive part of a user interface. I have a program that will generate drop-downs from a list of the text, but panel menus must be laid out by hand. Adding an extra feature at the last moment can force you to visually redesign the whole menu.

Panels offer the quickest selection, so you'd like to put as much as possible in them. But the bigger your panel is, the less room there is for the text or picture the user would like to see. Remember, the user has work to do. (Maybe MIDI programmers don't have this problem.) To save space lately I've taken to using both left and right mouse clicks over panel menus (e.g. left-click to select a color, right-click to go to the color menu).

Got to Admit it's Getting Better

Object Oriented Programming Systems (OOPS) are much the rage these days, ▸



Jim Kent's CyberPaint interface employs three different approaches: drop-down menus, keyboard equivalents and panel menus—in this case the APM panel menu. While the user is drawing all menus are hidden from view.

and there is a reason. The work with SmallTalk at Xerox PARC inspired GEM, the Macintosh display, Sun Windows and a host of other windowing systems. Lately, I've had a chance to play with SmallTalk a bit, and I like its windowing system better than any of these offsprings.

One idea Smalltalk uses that hasn't made it into the mainstream yet is to start a program in the same place you left it. In other words, instead of having to remember what you called a file, hunt for the place you were working on, reset your tabs, choose the correct font, etc., you simply run your text editor and you're in the same place you were when you last quit the program.

Remember the Basics

The two most important aspects of a friendly user interface are so obvious that they are often overlooked in theoretical discussions: A program must not crash, and it must be fast enough to keep up with the user. There's just no substitute for machine coding speed-critical program sections and then letting a hundred beta testers put a program through its paces.

If your design is too complex or your program too ambitious, you'll find it's nearly impossible to make your code fast and reliable. Keep it simple. Don't try to include every feature your product manager and early users suggest, or even all the ones you dream up yourself; it's better to do a few things very well. After all, you can always write another program once this one is bullet-proof and in shrinkwrap. ■

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An Animations Simulations Language

Pogo

BY JIM KENT
START CONTRIBUTING EDITOR

If you think there's nothing new in programming languages, then think again. Premiere ST programmer Jim Kent has created a great new "creature-oriented" language. It has features of C, Logo and even C++ and SmallTalk. It's Pogo and it's on the START disk this month. You'll need a color monitor to run Pogo.

Learn creature programming with POGO.ARC and POGOSRC.ARC an your START disk.

Pogo has its origins in the computer language Logo, which Seymour Papert created in part as a teaching tool for programming. Graphics in Logo employs the metaphor of a turtle with a pen tied to its tail; you move the turtle around the screen and it can leave a trail of where its been. You can tell the turtle to move forward or backwards, turn left or right, lift up or put down the pen and change the pen colors. A function to draw a circle using turtle graphics might look like this:

```
to circle()
{
for i = 1 to 36
    {
    forward(5)
    right(10)
    }
}
```

Turtle graphics programs are fun to write and easy to debug because the results are immediately visible on the screen. I've seen eight-year-olds write beautiful snowflake generators and intricate software spirographs in the time it takes their parents to reach the bottom line of their income tax spreadsheet.

Pogo, like Logo, uses turtle graphics. Pogo also has built-in animation features and a simple but effective approach to multiprocessing. Most of Pogo's syntax looks like C, but I borrowed a few things from BASIC. Even if you're a beginning BASIC or C programmer you should have no trouble writing Pogo code after studying some of the sample programs on disk.

Running Pogo

Pogo is an interpreted language. Pogo programs must be in ASCII format to

DAVID COULSON

run. To get started with Pogo, copy the files POGO.ARC and ARCX.TTP onto a blank, formatted disk and un-ARC POGO.ARC following the Disk Instructions elsewhere in this issue. (The Aztec C and assembler source code to Pogo is in the file POGOSRC.ARC.)

Pogo is a .TTP (TOS Takes Parameters) program, which means that when you double-click on POGO.TTP you will see the TOS Open Application dialog box. Type in the name of the Pogo program you wish to run; if you omit the file extension Pogo will use .POG.

You can install also Pogo as an application. From the Desktop, click once to highlight the POGO.TTP icon and select Install Application from the Options menu. Under document type enter POG and click on OK. Now all you have to do is double-click on a .POG file to run it. If you'd like to install Pogo as an application permanently, you must save your Desktop before shutting off your computer.

All Pogo programs run in low resolution; however, you can run Pogo from either a low or medium resolution Desktop. You can exit from any Pogo program by pressing [Control]-[C].

Pogo in Action!

This is one of several simple graphics demos on your START disk. Built-in Pogo graphics functions make drawing lines, circles, disks and rectangles a snap.

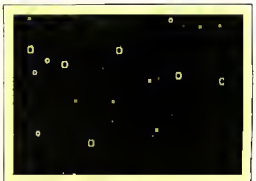
Archive File: POGO.ARC
Filename: LINES.POG
Related programs: CIRCLES.POG, DISKS.POG

Creature Comfort

The main thing that sets Pogo apart from traditional programming languages is its unique approach to multiprocessing. Traditional systems simulate multiprocessing on a single processor using a method known as time-slicing. A peripheral clock chip is programmed to interrupt the CPU at regular intervals. On receiving a clock tick, the current process is halted and the next process on the ready list is started. However, communicating between processes requires elaborate synchronization safeguards so that one process doesn't read data that another process hadn't finished updating when the clock interrupt was received.

Pogo, on the other hand, uses a technique I borrowed from the world of video games. In an arcade game, for example, the program must manage aliens, asteroids and one to four or five human players and each of these processes should appear to be happening at once. In Pogo, such processes are called *creatures*.

Each creature has its own code and private data and can take care of mov- ▸



Pogo in Action!

By defining a snowflake creature once, you can simulate a snowy evening simply by spawning and evolving snowflakes inside a loop. A more ambitious program could draw more complex snowflake shapes.

Archive File: POGO.ARC
Filename: SNOWING.POG

ing and displaying itself. Pogo has built-in routines for a creature to find its closest neighbor, so a creature can be responsible for killing whoever it collides with as well.

Pogo in Action!

This ecological simulation features fountains that create green dots, creatures that eat the green dots and creatures that eat the creatures that eat the green dots. Watch this fascinating demonstration to see which species survive!

Archive File: POGO.ARC
Filename: ECOLOGY.POG

Tell Me That It's Evolution

A typical Pogo program consists of a main section of code which creates the various creatures. The program then executes the creatures using the Evolve() function; usually this statement is inside a loop. Finally, the program might print some status when the creatures are done.

Once you've written the code for a single Pogo creature you can spawn multiple instances (copies) of it as easily as spawning one. For example, to fill the screen with stars you would first define a star creature as a flickering point of light, and then generate many stars in the loop:

```
for i = 1 to 64
    spawn(star,random(320),
    random(200),0,0)
```

Once creatures have been spawned, it is only necessary to use an Evolve() statement to have the program execute the star's code. Similarly, a single Evolve() statement will execute the code of all creatures that have been spawned as of that point.

This is a key feature of Pogo, one that places it closer to the class of object-oriented languages such as C++ or Smalltalk than BASIC, C or assembly language.

See the sidebar take-apart of the Warblers program for a complete example of creature-oriented programming in action.

And That's Not All . . .

We've included several sample Pogo programs on your START disk; they are all in the file POGO.ARC. LINES.POG, CIRCLES.POG and DISKS.POG are all graphic demos. BUSH.POG draws a pretty turtle graphics recursive bush; and the screen is saved to disk as a DEGAS .PC1 file.

FOLLOW.POG is a simple video

Pogo at a Glance

Here is a brief overview of Pogo's syntax and built-in functions. A complete description of each function and a more thorough discussion of the language itself is in the file POGO.TXT in the POGO.ARC file. After you've un-ARCed POGO.ARC, double-click on POGO.TXT to view or print the file from the Desktop.

Comments:
Everything to the right of a semicolon is disregarded.

Variables:
Declaration (type is either string or int)
```
    type i,j,k
    type linkcount
```
Arrays
```
    int bigarray[500], littlearray[16]
```

Numeric Constants:
Decimal constants. No floating point.
```
    5  100  -200
```
Hexidecimal constants
```
    0x10  0xFF  0xabc
```
Character constants in single quotes.
```
    'a'  '*'
```

Numeric Expressions (listed in decreasing precedence):
Unary plus and minus, binary not
```
    +5  -x  ~a
```
Multiplication, division, modulus, binary left shift, right shift, binary and
```
    5*5  a/b  4%3  a<<b  b>>c
    b&c
```
Addition, subtraction, binary or, xor
```
    a+b  x-5  a|b  a^b
```
Comparison operators: Equal to, not equal, greater, less, etc.
```
    a == b  a != b  a > b  a < b
    a >= b  a <= b
    hello == "Hi Doc!"
```
Logical not
```
    !a
```
Logical and
```
    a && b
```
Logical or
```
    a || b
```
(Note: Comparison and logical operations evaluate to 1 for true, 0 for false. In conditional branches any non-zero is considered true.)

String Expressions:
A string constant enclosed in quotes
```
"Hello World!"
```
A function returning a string
```
    StrNum(100)
```
Two strings concatenated with a plus

game. Move the disk with the mouse and try to avoid the little circles that come out of the upper left corner and go into orbit around you. If you get hit by a circle your disk grows, making it that much harder to avoid other circles. Eventually your disk gets so big you blow out and the game is over. The longer you stay alive the higher your score.

ECOLOGY.POG is an ecological simulation that really shows off the power of Pogo. The world contains fountains which generate green dots; red circles, blue circles and "purplers" all use green dots for food. When a green dot comes into range of a red, blue or purpler that creature gets a little bigger. Each of these creatures approaches survival in its environment a little differently. For example, purplers actively chase dots, whereas reds stake out a good position early in their lives and stay put.

The Ecology world also has a predator creature named Harry, an orange circle that hunts down reds, blues and purplers; when Harry encloses one of their center points, he gobbles them up and grows a little larger. The larger the creature he eats, the larger he grows.

When a red, blue or purpler—or Harry—gets big enough, it reproduces. It will get smaller and eventually die if there isn't any food around. Purplers are the only creatures smart enough to run away from Harry; however, often their flight takes them offscreen and away from their source of energy.

Ecology's screen shows some status information; it tells how many times the creatures have evolved and how many of each there are.

Pogo in Action!
This video game forces you, the large disk, against a host of smaller circles who follow you about. Use the mouse to control the disk: if one of the little circles touches you you grow even larger!
Archive File: POGO.ARC
Filename: FOLLOW.POG

Implementing Pogo

The source code for Pogo is in POGOSRC.ARC. Pogo is written in Aztec C and assembler. Much of the code is computer-independent; the files that are specific to the ST (mostly low-level graphics and I/O) all start with the letters ST.

Pogo is a one-pass recursive descent compiler that generates an intermediate code for a stack-based virtual machine. ▶

```
sign
   filename = "FRAME" +
   StrNum(i) + ".PCI"
```

Assignment statements:

```
var = expression
```

Compound blocks of statements:

```
{
statement1
statement2
. . .
}
```

If statements:

```
if expression
   statement1
else
   statement2
```

Loop statements:

```
loop
   statement
loop
   {
   statement1
   statement2
   if expression
      break
   statement3
   }
```

For statements:

```
for var = expression to expression [step]
   statement
for i = 0 to x
   statement
for i = 100 to 50 step -5
   statement
```

While statements:

```
while expression
   statement
```

Goto statements:

```
goto label
forever:
   Prints("Hello")
   goto forever
```

Constant declarations:

```
constant red = 3
```

Function declarations:

```
function say_hello()
   {
   Prints("hello")
   }
to add2(a,b)
   {
   return(a+b)
   }
```

Function usages:

```
say_hello()
a = add2(5, 2*c)
```

▶

which currently has about 32 instructions. Most of these are to implement all the operators it has. Upon sighting a constant or variable, it pushes it onto the stack. Binary operations take the top two members of the stack and replace them with the result. Unary operations act on the top of the stack. Each instruction is six bytes long—two bytes of op-code and four for data.

If you'd like to hack a new function into Pogo (perhaps some sound or a way to save Cyber Paint sequences), look at the file PREDEFS.C. If you'd like to see how a compiler can convert something like this statement into machine code:

```
d = SqrRoot( (x1-x2)*(x1-x2) +
(y1-y2)*(y1-y2) )
```

try studying the files EXPRESS.C and STATEMEN.C. If you just want to know how Pogo can read in a .PC1 file so much faster than DEGAS Elite, check out STGFX.C and STUNPACK.ASM and look for the function rpc1().

Pogo in Action!

This program uses a recursive function to draw branches. This program uses turtle graphics, which is a way to program graphics by giving directions to an imaginary turtle who moves about the screen. When the program is finished, it uses a built-in Pogo function to save the screen as a DEGAS .PC1 file.

Archive File: POGO.ARC
Filename: BUSH.POG

Conclusion

I've learned a lot writing the Pogo compiler. I hope you'll enjoy programming in Pogo as much as I do. I've always liked the C language, but C tends to crash the computer if you make a mistake. On the other hand, Pogo will usually tell you politely where the error occurred and let you exit cleanly without a reboot. You can break out of a hung-up Pogo program with [Control]-[C].

Pogo is not as fast as C, but most programs will spend most of their time doing graphics and other built-in functions which are in high performance machine code already. I'm not sure if Pogo is the answer to GFA BASIC 3.0, but for quick simulations and video games on a color system you'll find it hard to beat. ■

Jim Kent is a START Contributing Editor and the author of Cyber Paint, Aegis Animator, Flicker and the Audio-Video Sequencer.

Creature declarations:

```
creature name
   {
   statement
   statement . .
   }
```

Input oriented functions:

lnKey()
Keyboard()
WaitKey()
MouseX()
MouseY()
MouseLeft()
MouseRight()
Clock()
UseJoystick()
UseMouse()
Joystick() (see POGO.TXT for value returned)

Text output functions:

Print number in decimal on a line
   Print(number)
Print string and a new line
   Prints(string)
   Prints(NULL)
Print string without a new line
   Text(string)

General-purpose graphics functions:

ToText()
ToGraphics()
PutDot(color, x, y)
GetDot(x,y)
Rectangle(color, x1, y1, x2, y2)
Disk(x, y, radius, color)
Circle(x, y, radius, color)
Gtext(color, x, y, string)
Gnumber(color, x, y, digits, number)
Line(color,x1,y1,x2,y2)
ClearScreen()
SetColor(color, r, g, b)
   (Note: the values for r, g and b are from 0 to 255.)
LoadPic(filename)
SavePic(filename)

Screen-oriented graphics functions:

AllocScreen()
Pscreen()
UseScreen(screen)
CopyScreen(sscreen, dscreen)
Blit(w,h,sscreen,sx,sy,dscreen,dx,dy)
FreeScreen(screen)

Animation display functions:

PreSwap()
Swap()
DeSwap()
Vsync()

Turtle graphics:

(Note: turtle is floating point position. Not much good for real-time, but you

A Sample Program—the Warblers Game

A warbler is a circle that grows and shrinks as it moves across the screen. Some warblers pulse rapidly while others grow and shrink more slowly. You have a disk which follows the motion of the mouse. The object of the game is to surround the warblers with the disk when they are smaller than you are. If your disk surrounds a warbler, you eat it and your disk gets a little bigger. If the warbler surrounds your disk, *it* eats *you* and the game is over.

The warblers Pogo program is fairly simple. There are only two types of creatures—one for the warbler circles and one for the mouse disk. (Note: Pogo function and variable names are not case-sensitive. For clarity in this take-apart I'll use names starting with an uppercase letter for built-in Pogo functions and variables and lowercase for the ones defined in the warblers program. A semicolon marks the rest of the line as a comment.)

The code starts out with a few global variables.

```
int mouseid     ;The creature id of mouse so warblers can find it.
int mouserad    ;Radius of mouse. Gets bigger every other warbler you eat.
int warblers    ;Number of warblers alive. If it gets down to zero you win!
```

When a warbler goes offscreen it comes back on the other side. Here are two functions that help implement this "wrap around."

```
to wrapx(x)
[
if (x > 320+50)     ; offscreen 50 to the right?
   x = -50;         ; then move it to left of screen
if (x < -50)        ; offscreen 50 to the left?
   x = 320+50       ; then move it to right of screen
return(x)
]
to wrapy(y)
[
```

▶

can do lots of LOGO tricks.)
Right(degrees)
Left(degrees)
PenUp()
PenDown()
PenColor(color)
Forward(pixels)
Reverse(pixels)

Math functions:
Random(max)
XYangle(x,y)
SquareRoot(x)
Distance(x1,y1,x2,y2)
ArcX(angle,radius)
ArcY(angle,radius)

String-oriented functions:
StrNum(number)
StrChar(char)
StrLen(string)
CharAt(string, index)
CharTo(string, index, char)
NULL

Text file functions:
Fopen(name, mode)
Fclose(f)
GetChar(f)
GetWord(f)
GetLine(f)

Creature locating functions:
ClosestCreature(id,x,y)
ClosestT(type,x,y)
NamedCreature(name)
ExistsCreature(id)

Creature information functions:
CreatureX(id)
CreatureY(id)
CreatureAge(id)
CreatureNewBorn(id)
CreatureName(id)
value = Cread(type, var, id)
Cwrite(type, var, id, value)

Creature life and death functions:
id = Spawn(creature,x,y,dx,dy)
Evolve()
Kill(id) (Note: Kill(cid) amounts to suicide.)
KillAll()

Creature spawn parameters:
Cx
Cy
Cdx
Cdy

Other system-maintained local creature variables:
Cid
Cage
Cnew
Cname ■

A Sample Program—the Warblers Game

```
if (y > 200+50)
   y = -50
if (y < -50)
   y = 200+50
return(y)
}
```

Here is the code for the warbler creature. This is the brains of the program. The warblers take care of pulsating themselves and also see if they are having a run-in with the mouse.

```
   ;The pulsating circle creature.
creature warbler
{
int csize     ;current size
int dsz       ;rate of change of size
int cmax      ;maximum size
int cmin      ;minimum size
int color     ;color of this warbler
int md        ;used to hold distance to mouse
```

1st time through randomly initialize some of our variables.

```
if (Cnew)   ;Cnew is true only first time a warbler is Evolve()'d
   {
   cmin = Random(5)+2;        ;min radius
   cmax = Random(16)+5        ;max radius
   dsz = Random(3)+1          ;speed of radius change
   if (Random(1))             ;randomly make it start out shrinking or growing
         dsz = -dsz;
   csize = (cmin + cmax )/2   ;start ½ way through size cycle
   color = Random(4)+1        ;color random between 1 and 4
   }
```

Do stuff to figure out what size warbler is this frame.

```
if (!(Cage&31))    ;every 32 ticks increase max radius size by 1
   cmax = cmax+1
csize = csize + dsz
if (csize > cmax || csize < cmin)    ;if hit min or max reverse delta radius
   dsz = -dsz
```

Move warbler by adding its speed to its position, and piping through a 'wrap' function in case result is off-screen.

```
Cx = wrapx(Cx + Cdx)    ;Cx and Cdx are passed from the 'Spawn' call below.
Cy = wrapy(Cy + Cdy)
```

Interact with the mouse creature.

```
if (mouseid)    ;if the mouse creature is still alive. . .
   {
   ;find distance to mouse
   md = Distance(Creaturex(mouseid),Creaturey(mouseid), Cx, Cy)
   ;if inside mouse radius, suicide
   if (md < mouserad && csize < mouserad)
      {
      if (warblers&1)    ;every other warbler increment mouse radius
         mouserad = mouserad+1
      Kill(cid);
      warblers = warblers-1
      return;
      }
```

If mouse inside our radius kill it.

```
   if (md < csize && csize > mouserad)
```

```
    {
    Kill(mouseid);
    mouseid = 0;
    }
  }
Circle(Cx,Cy,csize,color)     ;draw ourselves
}
```

The mouse creature is quite simple since it doesn't need to figure out whether it has hit a warbler or not. It just calls the built-in Mouse functions to set its current position on the screen (Cx and Cy) and then draws a disk in color 13.

```
creature mouse
{
Cx = MouseX()
Cy = MouseY()
Disk(Cx,Cy,mouserad,13)
}
```

Finally there's the main code for the game:

```
loop    ;repeat forever (or until user doesn't want to play again)
  {
  KillAll()              ;Kill any creatures left from last game
  mouserad = 8           ;mouse starts with an 8 pixel radius
  mouseid = Spawn(mouse,0,0,0,0)     ;make the mouse
  for warblers = 0 to 12     ;make 13 warblers
    {
    int ix,iy
```

Make a warbler at random position on screen and random speed between −3 and 3.

```
    ix = Random(6)−3     ;speed from −3 to 3
    if (ix == 0)     ;don't allow 0 x speed
      ix = 1
    iy = Random(6)−3
    if (iy == 0)
      iy = 1
    Spawn(warbler, Random(320), Random(200), ix, iy)
    }
  PreSwap()     ;Set up for double buffering
```

Here's the main game loop. Keep going as long as there's warblers alive and the mouse is alive too.

```
  while (mouseid && warblers>0)
    {
    ClearScreen()     ;set screen quickly to black
    Evolve()          ;let all creatures live one tick
    Swap()            ;swap drawing screen and viewing screen
    }
  ToText()            ;back into text mode
  Prints(StrNum(warblers) + " Warblers left");
  if (warblers <= 0)
    {
    Prints("You won!!!")
    }
  Prints("Play again? (y/n)")
  int key     ;oops, need another variable. . .
  key = WaitKey()
  if (key == 'n' || key == 'N')
    break
}
```

And that's all there is to it: a video game in about 100 lines of code!

■

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UltraScript

Atari's Answer to PostScript Fever

BY ANDREW REESE
START EDITOR

UltraScript—you've heard the name for months and it's finally out. But the question now arises: what is it? It's neither a desktop publishing program, nor a word processor. It's a PostScript interpreter that turns (almost) any Mega/printer combination into a f-a-s-t PostScript printer.

Up to now, if Atari desktop publishers wanted to print PostScript files from other computers, it was impossible. The second generation of ST DTP programs can create a PostScript file or print on a PostScript device, but until UltraScript, it has been strictly a one-way street.

Enter UltraScript from Imagen. UltraScript can read a PostScript file and output it to an ST-driven printer. It may sound like a glorified printer driver, but you have to understand the background to see its significance.

```
% Copyright (c) 1989 Atari Corporation.  All rights casarved
/inch {72 mul} def
1 inch 10.25 inch moveto
/Lucida findfont 24 scalefont setfont
(Lucida) show
1 inch 9.75 inch moveto
/Lucida-Bold findfont 24 scalefont setfont
(Lucida-Bold) show
1 inch 9.25 inch moveto
/Lucida-Italic findfont 24 scalefont setfont
(Lucida-Italic) show
1 inch 8.75 inch moveto
/Lucida-BoldItalic findfont 24 scalefont setfont
(Lucida-BoldItalic) show
1 inch 8 inch moveto
/LucidaSans findfont 24 scalefont setfont
(LucidaSans) show
1 inch 7.5 inch moveto
/LucidaSans-Bold findfont 24 scalefont setfont
(LucidaSans-Bold) show
1 inch 7 inch moveto
/LucidaSans-Italic findfont 24 scalefont setfont
(LucidaSans-Italic) show
1 inch 6.5 inch moveto
/LucidaSans-BoldItalic findfont 24 scalefont setfont
(LucidaSans-BoldItalic) show
1 inch 5.75 inch moveto
/LucidaSans-Typewriter findfont 24 scalefont setfont
(LucidaSans-Typewriter) show
1 inch 5.25 inch moveto
/LucidaSans-TypewriterBold findfont 24 scalefont setfont
(LucidaSans-TypewriterBold) show
1 inch 4.75 inch moveto
/LucidaSans-TypewriterOblique findfont 24 scalefont setfont
(LucidaSans-TypewriterOblique) show
1 inch 4.25 inch moveto
/LucidaSans-TypewriterBoldOblique findfont 24 scalefont setfont
(LucidaSans-TypewriterBoldOblique) show
1 inch 3.5 inch moveto
/Lucida findfont 24 scalefont setfont
(LucidaSymbol) show
5.75 inch 3.5 inch moveto
/LucidaSymbol findfont 24 scalefont setfont
(\245\251\323\324\340\302) show
1 inch 3 inch moveto
/Lucida findfont 24 scalefont setfont
(LucidaHebrew) show
7.25 inch 3 inch moveto
/LucidaHebrew findfont 24 scalefont setfont
(ABCDEF) show
1 inch 2.5 inch moveto
/Lucida findfont 24 scalefont setfont
(LucidaHebrew-Typewriter) show
7.25 inch 2.5 inch moveto
/LucidaHebrew-Typewriter findfont 24 scalefont setfont
(ABCDEF) show
1 inch 1.75 inch moveto
/Courier findfont 24 scalefont setfont
(Courier) show
1 inch 1.25 inch moveto
(Symbol) show
5.75 inch 1.25 inch moveto
/Symbol findfont 24 scalefont setfont
(\245\251\323\324\340\302) show
showpage
```

Figure 1. An example of a PostScript file. These commands are interpreted by UltraScript to create an image for the printer.

Why PostScript?

PostScript is the creation of Adobe Systems Incorporated of Walnut Creek, California. It's a unique and specialized programming language whose sole function is to describe page layouts to "smart" computerized printers. Adobe pioneered this field and, like Epson printers or DEGAS files, the pioneer has set the standard for the industry. It has become the DTP buzzword in the Macintosh and PC worlds. We have some darned good DTP products on the 16-bit Atari's, but it's been an uphill ▶

Lucida
Lucida-Bold
Lucida-Italic
Lucida-BoldItalic

LucidaSans
LucidaSans-Bold
LucidaSans-Italic
LucidaSans-BoldItalic

LucidaSans-Typewriter
LucidaSans-TypewriterBold
LucidaSans-TypewriterOblique
LucidaSans-TypewriterBoldOblique

LucidaSymbol ∞♥©™◇ℜ
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Courier
Symbol ∞♥©™◇ℜ

Figure 2. This is o printout of the file shown in Figure 1, as printed on on Atori SLM804 loser printer.

battle to establish their credibility outside the ST community without PostScript compatability.

There are some very nice aspects of PostScript, however. For example, it uses vector fonts that are only defined once and scaled as needed when a page-description requires a specific size. PostScript vector fonts can be scaled smoothly without adding "stair-steps," unlike the bit-mapped ST system fonts. (Vector fonts are also used by ISD/Ditek's Calamus to achieve the same clean output in any font size.)

An example of a PostScript file is shown in *Figure 1*. When sent to a PostScript printer, these commands are interpreted by the printer's microprocessor to create an image for the printer engine. *Figure 2* shows the file from *Figure 1* as printed on an Atari SLM804 laser printer.

One reason for the lack of PostScript compatability in the ST world is that it's expensive. Adobe has acted like the true entrepreneurial pioneer it is and has exploited its near-monopoly in this field; developers must pay a pretty penny to use Adobe's PostScript in their programs or printers. For the Atari ST/Mega market, dedicated to "Power Without the Price," these added costs have put full PostScript compatibility out of the reach of most owners.

PostScript printers are also expensive. They need a built-in computer, including a microprocessor with its associated RAM and other circuitry, to turn a PostScript file into a page. Most PostScript printers use either a Motorola 68000 or 68020 microprocessor and a *minimum* of 512K of expensive DRAM. Since the Atari SLM804 laser printer is a so-called "dumb" printer (no internal microprocessor), its cost is much less. All of the necessary calculations are performed by the ST/Mega's 68000 processor using the computer's RAM. Actually, the Atari system isn't dumb at all—it just doesn't duplicate the computer's capabilities inside the printer.

Imagen's Solution

What Imagen has created is an interpreter that can read and use PostScript files, just as LDW Power can read and use Lotus 1-2-3 files. But in the ST/Mega environment, UltraScript converts from PostScript code to finished page inside the computer and then sends it out to the Atari laser printer via the DMA port, a very fast and effective method.

Imagen also went to the same font foundries that licensed fonts to Adobe and licensed their own versions for use in UltraScript, thus allowing typeface compatibility with PostScript.

Although well below any Adobe-

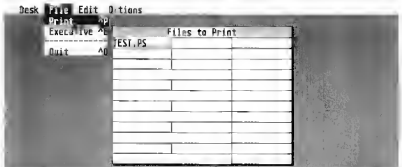

Figure 3. The UltroScript screen. At the top ore several drop-down menus. The lorge grid is the printer queue list ond below it is the Message Window. Not much here, but operotion of the program is simplicity itself.

licensed product in cost, UltraScript is still not cheap by Atari standards, however. The program with its Lucida font family costs $229.95 and additional fonts can cost up to $99.95 each. You can buy Font Sets that reduce this cost considerably, however. The Times, Helvetica and Courier fonts together are available for $129.95 while ITC Bookman, Helvetica Narrow, ITC Zapf Chancery and Dingbats, ITC Avant Garde Gothic and New Century Schoolbook are available for an additional $195.

Other fonts that are available (or should be by the time you read this) include: Optima, Park Avenue, ITC Garamond, ITC Souvenir, ITC Lubalin Graph, ITC Korinna, Univers, Hobo, Brosh Script, Stencil, Helvetica Light and Black, Futura, ITC New Baskerville, Lucida Calligraphy, Eurostile, Cooper Black and Crescendo, an original music font that is compatible with Sonata.

Using UltraScript

We tested the first release version of UltraScript for this review. It was written to output exclusively to the Atari laser and checks for it on start-up. If you don't have an SLM804 with this version, forget it—it's back to the Desktop for you. By the time you read this, however, a second version should be available that includes support for the Hewlett-Packard Deskjet, Epson FX, LX, LQ and LQ950 and the IBM Graphics and Pro Printers. We weren't able to obtain this later version for testing by press time, but watch for an update in START in the near future.

With an SLM804 connected, however, using UltraScript is simplicity. Imagen recommends use of a hard disk for speed and we concur. It's a big program, over 280K and that means that you need memory—and lots of it. UltraScript requires at least two megabytes of RAM, so you'll need at least a Mega 2 or an ST upgraded to that size or more.

When you start up UltraScript, you see the screen shown in *Figure 3*. In the top half of the screen is the file queue. In monochrome, you can load up to 36 files for printing, but in color (medium resolution), you're limited to 27 files. That should still be enough for most users, however. In the bottom half of the screen is the message window. UltraScript reports on its status here and alerts you to any actions you must take, such as to insert paper for manual feed.

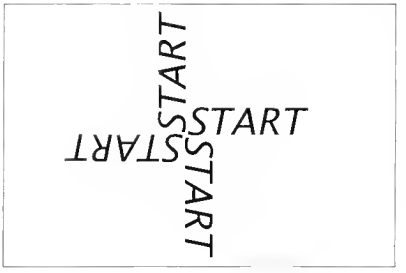

Figure 4. The short piece of PostScript code listed in the text produces this print-out. UltraScript has on Exutive mode that lets you enter such code directly. It's o convenience designed for the PostScript professional only.

The drop-down menus offer few choices. You can load a file into the queue, delete a file from it or have a file appear more than once. You can also choose manual paper feed from the Options menu or enter the Executive mode. In this mode, you can enter PostScript code directly, but heed the warning in the manual: you had better be intimately familiar with PostScript to make use of Executive mode.

Once you've loaded all the files you want to print into the queue, you just select Print from the File menu and you're off and printing. And the printing is fast—no more going out for a cup of coffee while waiting for a document to print, as with the average PostScript printer.

UltraScript and Timewarks Desktop Publisher ST

Imagen has added one additional fillip to UltraScript. In order to create a complete PostScript DTP system (probably at Atari's bidding), Imagen created a PRINTER.SYS file that lets Timeworks' fine DTP program, Desktop Publisher ST, create PostScript files. The idea is great; the implementation less so.

After you've installed Desktop Publisher ST according to the instructions in the Timeworks and Imagen manuals (PostScript/LaserJet II printer), you copy Imagen's PRINTER.SYS file to your Timeworks folder or disk and overwrite the file of the same name already installed. Then you run FONTWID.APP, as usual.

When you boot Desktop Publisher ST, you'll find the Imagen fonts listed in the Font Style/Size menu, instead of the GEM fonts you're used to. Unfortunately, the Timeworks program can't display these fonts on the screen, except as gray bars indicating the size and location of the copy. It's a bit disconcerting to see one's copy treated so cavalierly. Instead of WYSIWYG, it's WYSIHNWYG—What You See Is (Hopefully) Not What You Get.

To add to this inconvenience, you can't print directly from the Timeworks program. When you print, it prints a PostScript file to disk called PUBLISH.PS. Unless you use an accessory utility that lets you change filenames in mid-application, you must exit Timeworks, change the name of the file you created and then re-enter the program to create a second file. If you want to print a file, ▶

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544 Second St.
San Francisco, CA 94107

you have to quit Timeworks again and boot UltraScript. It's all very clumsy, but we probably shouldn't be too harsh on a company who's trying to deliver extra value to its customers. After all, they didn't have to do this at all.

If you do manage to work through the Timeworks/UltraScript combination, you will end up with very nice

UltraScript reads a PostScript file and outputs it to an ST-driven printer.

printouts. It's just that it's like taking the long way around the Cape, instead of using the Panama Canal.

Executive Mode

None of us at START are PostScript mavens, but we did experiment with the Executive mode to make sure that it worked as advertised. There's a short demo code listing in the manual as follows (slightly modified for the occasion, of course):

```
/inch {72 mul} def
/LucidaSans-Italic findfont 72 scalefont
  setfont
4 inch 6 inch translate
4 {
0 0 moveto
(START) show
90 rotate
} repeat
showpage
```

The result of this short piece of code (which selects and sets a font and size and then uses a loop to rotate it 90 degrees four times) is shown in *Figure 4*, photographically reduced. Not bad at all, but we'd hate to try to create a complex page layout this way. Again, it's an extra, so thanks, Imagen, for including it.

The Bottom Line

UltraScript is a joint project by Atari and Imagen, a subsidiary of QMS, the printer company. The program is copyrighted by Imagen and they maintain the marketing and support functions. With Imagen's expertise and experience in printing, coupled with resources matched by few other Atari publishers, you can expect that the support will be excellent. We're glad to have them supporting our computers.

When you first open the box, you may feel that you aren't getting your money's worth with UltraScript. There are two double-sided disks containing the program and the Lucida fonts, a slender manual and assorted warranty and order cards. It doesn't look like much, but the value of this program is in the product, not the packaging. The manual tells you everything you need to know in its 40 pages to run UltraScript; it's just not that difficult.

Does it work? Yes, absolutely. Do you need it? Only if you need to print PostScript files on your ST/Mega printer. Is it an important product in the Atari world? We think so. It offers a capability to ST/Mega owners that has been missing over the last three years of the ST's existence. ■

PRODUCTS MENTIONED

UltraScript, $229.95; **Fonts** and **Font Families**, $99.95-$295. Imagen Corp., P.O. Box 58101, Santa Clara, CA 95052-8101, (800) 635-3997 or (408) 986-9400.
CIRCLE 160 ON READER SERVICE CARD

Desktop Publisher ST, $129.95. Timeworks, 444 Lake Cook Road, Deerfield, IL 60015, (312) 948-9200.
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File Search

Finding Lost Files Made Easy

BY DAVID T. JARVIS

You've got a 20-megabyte hard disk that's full to the brim with hundreds of folders and files. One day a friend asks you if you still have that public domain game you downloaded months ago. You think you do but where? With START Magazine and David Jarvis' File Search, you need never again worry about "lost" files. The program runs in all three resolutions.

File Search is a desk accessory that will quickly locate files and programs, whether they're on floppy disks or buried deep within folders on your hard drive. But File Search goes well beyond a basic file-search utility to become something of a file manager as well. It can find a file anywhere on any of your disks, even if the file is "hidden." And once the file is found, File Search will let you perform a number of useful operations, including browse, print and copy.

But that's not all. File Search supports wildcards, and a special option lets you either display each match it finds or simply count the matches (and the number of bytes occupied by each) and then give you the totals when it's finished. And since File Search is an accessory, you won't have to leave a GEM application to take advantage of it.

File Search can find a file anywhere on any of your disks.

To run File Search, copy FSEARCH.ARC and ARCXTTP onto a blank, formatted disk and un-ARC FSEARCH.ARC following the Disk Instructions elsewhere in this issue. Then copy the file FSEARCH.ACC onto your boot disk, and reboot your computer. Remember that GEM only supports a total of six desk accessories, so if you already have that many installed, you'll need to deactivate one of them to use File Search. The program was written in Mark Williams C; the source code is also in the file FSEARCH.ARC.

ELLEN SASAKI

The Search Begins

After the accessory is installed, click on File Search under Desk on the menu bar. The main File Search dialog box will appear. Type in a specific filename, click on the disk drive you wish to search, then click on Search. Click on Quit to return to the Desktop.

There are three Search options.

Note: Attributes are the specific conditions TOS associates with a file. TOS allows up to six attributes: Read Only, which can be set from the Desktop File drop-down menu; Hidden, which won't show in a GEM directory window; System, a file created for use by TOS; Volume, the disk label; Folder (or subdirectory); and Archive, which means that the file has not been changed since the disk was last backed up. If a file has one of these attributes, its box will be highlighted; if not, its box will be shadowed.

Two types of options are available to you now: TOS functions and Search functions. There are six TOS functions:

When you click on the File Search accessory, you'll see this dialog box. Now you just type in the name of the "lost" file, choose the drive you wish to check, and then click on Search—presto! You've found your file, *even if it's hidden.*

You can narrow a search down further by entering a folder name before the file specification; the folder name must be preceded by a backslash (for example, \LETTERS\JONES.DOC).

Once the search begins, File Search will check whichever disk you specified, beginning at the root directory and continuing through all folders on the disk until it finds a match. Then, unless you specified Totals Only in the main dialog, you'll see a second dialog box that describes the file and gives you a number of options. The information about the file displayed here includes the full filename, the file size, the last date and time the file was updated and the file's attributes.

Browse, Rename, Copy, Move, Delete and Print.

Browse lets you rapidly scan a file's contents without having to invoke an editor. This is useful when you only need to read part of a file, or determine which version of a file is the one you want. When selected, Browse opens a window and displays the file's contents, one page at a time. Browse displays only the ASCII characters in a file. You can move or resize the window the same way you would any other GEM window. Click on the close button to return to the dialog box describing the file.

Copy, Move, Rename and Delete are pretty self-explantory. The first three options will require you to enter a sec- ▶

ond filename. Delete will ask you to verify the operation before it actually erases the file. Print lets you print out a hardcopy of the file.

At this point, there are three Search options available: Continue Search, Return to Search Menu and Quit. Continue Search is the default; you can invoke it just by pressing [Return] or [Enter]. It tells File Search to keep on rummaging through the disk until it finds another match or has searched all folders.

Quit clears the dialog box and then returns you to what you were doing when you selected File Search. Select Return to Search Menu to return to the main dialog box. This option remembers the current file search specification, so you can quickly look for the file on another drive. Alternately, you can type in a new file to search for and begin again.

Wildcard Support

File Search lets you search for files by typing in wildcard characters. Wildcards let you search for words or groups of words that have the same characteristics. There are two wildcard characters recognized: a question mark (?) and an asterisk (*).

When you conduct a wildcard search with a question mark, your ST will replace the question mark with any single character. An asterisk, on the other hand, will be replaced with more than one character. For example, if you search for T?T, the computer might come up with TAT or TOT. But if you search for T*T the computer will come back to you with anything from TART to TRUMPET. You'll find this one of File Search's most convenient features.

File Search supports wildcards.

Hey, It's a Floor Wox, Too!

Well, File Search isn't *really* a floor wax, but it does have other uses than those already covered. First, there's a feature designed for the times when you know a file is on one of several disks, but forget which one. For example, your friends are waiting to see that nifty public-domain game called Stinker you downloaded last week. Unfortunately, it's on one of 15 disks labeled "Games." Now, where is it? File Search can help. Just put the first disk in the drive, access File Search, enter ST!NKER.* and click on Search. If File Search doesn't find a match on the current disk, a dialog box will appear telling you so. Note there's a second option: Repeat. Before clicking on Repeat, put the second disk in the drive. And start the search again. I think you get the idea.

File Search can also provide you with some statistics about files on a disk. In the main dialog box, there are two boxes under the word Report. One says Each Match, and the other says Totals Only. The former is selected by default. If you click on the latter before conducting a search, File Search will not display each file it finds that matches the specification you entered; instead, it will continue searching. When it's finished, you'll see the results, either that no matches were found, or how many matches were found and the total number of bytes used by all matching files.

After File Search has found one or more matching files using either "Each Match" or "Totals Only," you can examine the list of files found by clicking on Browse under Files Found on the main screen. You can print out the list of files by clicking on Print.

The Totals Only option can be put to some interesting uses. Suppose, for instance, you have files with the extension .DOC all over your hard-disk drive and would like to know how much space they occupy. You can find out by clicking on Totals Only, entering "*.DOC" as the filespec, then clicking on Search. In a few moments the results will be displayed to you.

A final feature of File Search is that it will find "hidden" files. As mentioned before, files with the "hidden" attribute don't show up in GEM directory windows (the list of files that appears in a window when you click on a drive or folder). However, File Search disregards the standard protocol to "ignore" such files. So even if you've changed a file's attribute to "hidden," it will show up again under a File Search. ■

David Jarvis is a programmer who lives in Richmond, Kentucky. He wrote Ear Trainer in START Special Issue Number Two.

WARNING!

Because File Search can search an entire hard drive partition for a file, it is very easy to exceed the ST's so-called 40-folder limit by using this program; this can wreak havoc with your drive's directory. Because of this problem, we highly recommend using File Search together with Atari's copyrighted FOLDRXXX.PRG terminate-and-stay-resident fix for the 40-folder limit. If you don't have FOLDRXXX.PRG, it is on this issue's START disk in the file FOLDRXXX.ARC. Un-ARC this file onto a blank, formatted disk and read the enclosed documentation. We consider this program a necessity for any hard drive owner using File Search or other directory-intensive application.

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MichTron's DevpacST

A Speedy Way to Code

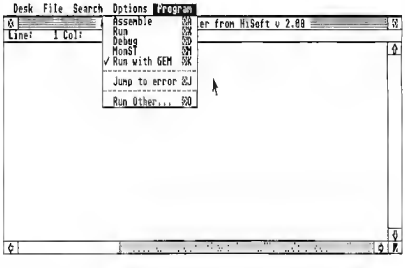
BY PAUL DANA

The most limiting factor in developing software is *time*. After all, code is the manifestation and crystallization of ideas. Creating code requires a lot of thought, and that can take time. Assembly programming is especially time-consuming because of the high attention to detail that it requires. When buying development software, therefore, an important question for the programmer is: "Will this product save me time?"

Most of a programmer's time is spent in a process referred to as "The Development Cycle." This is the time it takes to write some code, assemble and run it, watch it fail, debug until you understand what's wrong, fix the bugs, and write some more.

A good development system lets you execute the above process as quickly as possible, thereby creating more working code in less time. All systems include an editor, an assembler, a linker and usually a debugger and various utility programs for symbol cross-referencing, formatted printing, etc. Good systems also provide a realistic way for the programmer to put these tools to good use.

Some packages accomplish this by integrating all the software tools used during the development cycle into a unified "environment." In such an environment, any tool is accessible and you can save, edit, assemble, link or run your program instantly. This eliminates the need to hunt for the right tool, or to quit one program and start another. MichTron's DevpacST version 2.0 provides just such a programming environment, and I recommend it strongly to anyone planning to develop quality software in assembly language for the ST.



DevpacST uses an integrated environment; you can access the assembler, debugger or editor from a GEM menu bar.

Responsive Interface

The first thing you'll notice when using Devpac is how responsive the interface is. Mouse input is clean, not sluggish. You never have to wait while Devpac redraws the screen or switches back and forth from the debugger to the editor to the assembly options dialog. Virtually the entire system was written in assembly, and it shows. Altering, assembling and running the program is very fast. Better yet, debugging is easy and only a keypress away!

The entire system is GEM-based, so you already know what it looks like. It has no special "control panel" nor any exotic interface features—just a menu bar and a full-screen editing window. You can access the various options dialogs directly from the menu bar. Separate screens are maintained for the ▸

debugger and the program you're writing. The debugger is not GEM-based, but is a "windowed" text view showing the usual low-level debugging information. There are windows showing the registers, contents of memory, instructions surrounding the program counter and a window for your command input.

The Good, The Better, The Best

Symbols are left-justified in the debugger's instruction window, with the disassembled code indented. Thus the display resembles the programmer's source code, making it intuitively easy to read. The debugger maintains a separate screen, allowing easy debugging of graphics programs.

The editor uses the ST's keypad as a second set of arrow keys and provides key equivalents for every menu entry (for the mouse-a-phobic). The editor screen scrolls sideways automatically when you enter a long line. Key equivalents for the editor are WordStar-like, which is nice if you're used to any of the plethora of editors like this.

Devpac comes with a .TTP version of the assembler for use in a command shell environment and includes a GEM menu-making utility. It provides IBM-style "[Controll-[Alternatel-[Deletel" resetting during debugging.

The linker can produce symbols for use with HiSoft BASIC, Prospero Fortran and Pascal, Lattice C and Alcyon C (or any DRI-compatible compiler).

Best of all, you can launch any program from within Devpac and can debug programs written in *any* language.

When you use the editor, the [Helpl key provides help messages. In the debugger, however, I do *not* like the [Help] key function. It displays an instruction screen—which contains no readable help of any kind! What's the point? Also, I found the debugger screen to be too crowded. Most of the space is taken up with text; I would have preferred more white space around each item in the display (except for the instruction window, which is very nice.) I appreciate all the information that the debugger gives, but not the eyestrain. Perhaps the ability to "hide" parts of the display would have been better, or the ability to switch between two screens. Better yet, why not make the debugger GEM-based too?

Also, the editor can edit only one file at a time. This is a severe limitation on the whole system and could make the programmer *waste* time.

The first thing you'll notice when using Devpac is how responsive the interface is.

Trying It Out

I am primarily a C programmer and generally use assembly only to create optimized versions of functions I have already written in C. I use the Mark Williams C compiler, which also comes with a complete "environment" for creating programs. However, Mark Williams C uses a Unix-like command shell as its essential environment. It's "command line-oriented" rather than "mouse-oriented," so, by way of comparison, I also tried out the .TTP version of Devpac. To make it work, I had to specify that it was to produce a DRI-compatible object file and then convert that file to Mark Williams format (with a utility provided by Mark Williams). This worked without a hitch.

A problem arose when I tried to run the GEM-based version of Devpac from within the Mark Williams command shell. I got a nasty "TOS error #33" message. This is most likely a problem with the Mark Williams command shell, but beware. Gulam, a shareware command shell, runs Devpac without any problems.

Documentotion Is Everything

Perhaps the greatest asset that any development system can provide is documentation that's easy to understand. A common flaw in software manuals is that they assume too much knowledge on the part of the reader. Although programmers are generally technically minded, they may be new to the system they're writing for. A well-written manual can save as much time as a debugger.

In this way, Devpac is as suited to the greenhorn ST user as it is to the battle-scarred veteran. The manual starts with an explanation of what readers should do, depending on their level of experience. If you have used an ST and a 68000 assembler before, you won't need to trudge through tutorials. You're given short, sweet instructions on how to get a program assembled and running; then you're directed to the section on the debugger. If you're an experienced assembly programmer but have never used an ST before, one useful section describes the ST interface, the use of tabs in a dialog box, etc. For owners of Devpac version 1.0, another section outlines the new features of version 2.0.

Furthermore, the manual covers the basics of writing GEM-based software and even provides a skeletal GEM program to start with. Notes on writing desk accessories and a useful utility are included that lets you create GEM menus easily without needing a resource construction set. It also has a section on the Motorola 68000 instruction set, but this is just a brief summary—beginners will need a supplementary text.

In general, the manual is very nice except for two annoying details. First,

there is no section describing how to best to use Devpac with *your* particular set-up. Obviously, computer users with a hard drive will organize themselves differently from those with double-sided floppies and one-megabyte RAM disks. Users want help with this kind of stuff because it saves time!

Secondly, an important item appeared out of place. The paragraph describing the typographical conventions used throughout the manual should be at the beginning, but in the Devpac manual it's stuck at the bottom of page 8—at the *end* of the first tutorial. The "experienced ST users" who were instructed to skip this tutorial would have missed this information.

The most limiting factor in developing software is *time*.

Nonetheless A Bargain

Still, I consider Devpac a bargain for the serious software developer. It's a complete system that can produce stand-alone applications or desk accessories that make full use of the GEM interface. Devpac provides everything you need to start programming right away. It will save you time and, after all, that's the name of the game. ■

Paul Dana is a professional software engineer whose hobbies include musical composition and performance. This is his first publication in START.

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The Latest Gadget and Desktop Presentations

BY DAVID PLOTKIN
START CONTRIBUTING EDITOR

As I write this in late March, Gadgets by Small has just released Spectre 128 Version 1.9. If you haven't upgraded to Spectre 128 yet, you should definitely consider it – the list of software which runs on Spectre 128 but not on Magic Sac grows longer with each new revision. Version 1.9 is the first release with active sound, although author Dave Small warns that the sound isn't "bullet-proof" yet – he's just putting it out there for people to try. If you aren't feeling experimental, you can just leave it disabled.

Also Dave has fixed some other minor bugs, although I've never seen most of them. Further, he's beginning to talk about the newest product from Gadgets by Small, Spectre GCR. It plugs into the cartridge port, replacing the current Spectre, and lets your ST read and write Mac disks at virtually full speed. It's going through final testing now.

As many of you are aware, Data Pacific's Translator One, which also lets you read and write Mac disks, is painfully slow, primarily because it uses the ST's MIDI ports. While these ports are plenty fast enough for their intended purpose, music codes, their speed isn't close to that of the cartridge port. I have high hopes for Spectre GCR.

Microsoft's Powerpoint is a bit pricey for the ST world at $295, but if you need an easy way to create desktop presentations, then this may be your solution. You can create obsolutely stunning slides like this one, using Spectre 128, Powerpoint and an outside translation service, like Genigraphics.

Powerpoint

One of the ways that Apple has been successful in marketing the Macintosh is in "niche markets," focusing on those specialized tasks that the Mac is perceived to do well. Good examples are Desktop Publishing and CADD (Computer-Aided Design and Drafting). A fairly new niche market is known as "desktop presentations." Essentially, this refers to producing slides and overhead projector transparencies designed to accompany and illustrate a live presentation. This sort of software can be a godsend, especially for professionals who do a lot of presentations. We can put together the materials we need in just a few hours, without resorting to outside help – which always seems to be too busy to produce what we need when we need it.

Desktop presentation packages tend to be expensive – they're created for the business market, after all – but about the most reasonable is Microsoft's Powerpoint. This powerful package can be used quite well on an ST with Spectre 128 and, since it adheres to the stan- ▸

dard Mac interface, it can be learned very quickly.

The Mechanics of Powerpoint

Powerpoint is very straightforward, and creating a slide is easy. Along the left side of the screen there are various tools, including shapes (circles, boxes, lines), a text tool and a text box. The text tool lets you lay down text anywhere on the screen, while the text box lets you draw a box first, then place the text in the box. The advantage of the text box is that it automatically word-wraps when your typing reaches the right side of the box, thus providing you with a mini-word processor.

From the menu at the top of the screen, the various shapes can be filled, shadowed, brought to the front or sent to the back, fill pattern selected, and their colors set. The colors of the outline, fill, and shadow can all be set independently. Of course, on a black-and-white Mac (or an ST running Spectre 128), you can't actually see the colors (which look absolutely stunning on a fully-configured Mac II, *sigh* ...). But those colors can be reproduced when creating the final slide/overhead (more on this in a moment). If you don't like how the objects look, you can select them and resize them or drag them to a new location.

You can set text size, color, font and effects (bold, italics, etc.) from the menu. Since you can use the text cursor to highlight portions of the text, you can change any of these properties for any part of the text. You can also move text around if it doesn't look quite right where you put it. You can also define a new text style (combination of font, size and effect) which can be added to the menus. This can be handy if you use a particular style of text a lot. Powerpoint even includes a spell checker, which will highlight any words not found in its extensive dictionary—and you can add your own special words to it also.

Color shading can give quite a bit of impact to your slides, although, once again, you can't see the effect on your screen. Powerpoint supports shading in any of its primary colors, and you can select the variation in shading (from dark to light) from sliders. Further, you can select how you want the shading done—horizontally, vertically, diagonally, corner-to-corner, etc.

Checking Out Your Work

Each slide has a title which identifies that slide. Once you have constructed several slides, you can move through them in several ways. The first way is a screen which shows a reduced-size version of each slide. If all the slides won't fit on one screen, then the window can be scrolled. To look at a particular slide, you merely double-click on its reduced version and the slide will appear on the screen. You can also rearrange the order of slides from this screen by clicking on the slide and dragging it to a new location. The second way to view all of your slides is by a titles list. Again, you can double-click on a selection or click and drag a title to rearrange the order of the slides. Finally, there is an elevator on the left side of the screen; click and drag on the elevator to move through your slides.

Of course, Powerpoint comes with an onscreen slideshow program, which can be set either to wait a specified time between slides or for a keypress.

Powerpoint supports a slide "master" on which you can set up items you want to appear on each slide. It also lets you output a Notes page containing a reduced version of your slide with space for notes at the bottom of the page. A Handout page, consisting of reduced versions of all of your slides, is of limited usefulness, however.

Making Slides

Once you have created your slide or transparency series and saved it to disk, it needs to be translated into a media that can be presented to an audience easily. Dragging a computer along to a presentation and showing the illustrations on a big-screen TV is impractical. Moreover, if you are working with Spectre 128 (as we are), you can't show any colors, since Spectre emulates a monochrome Macintosh.

Fortunately, you do have options. Many copy centers have the equipment to turn a Powerpoint disk file into absolutely beautiful slides, but the disk must be in Mac format, which means you need Translator One or the upcoming Spectre GCR. The other option is to use Genigraphics, a nationwide service organization which specializes in making slides. Powerpoint directly supports sending a file by modem to Genigraphics. In fact, if you do use their services, a special package of effects from their standard library can be incorporated in the slides. The turnaround time for Genigraphics is much longer, however, than a local copy center.

Overall, Powerpoint is a remarkably powerful and easy-to-use package that fulfills a need which is currently unmet in the ST world. I have used it and highly recommend it for those of you who need its special strengths. ■

David Plotkin is a chemical engineer for Chevron U.S.A. and a Contributing Editor for START.

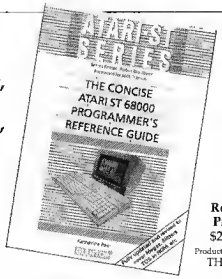
PRODUCTS MENTIONED

Magic Sac+, $149.95; **Translator One**, $299.95. Data Pacific, Inc., 609 West Speer Blvd., Denver, CO 80203, (303) 733-8158.
CIRCLE 151 ON READER SERVICE CARD

Spectre 128, $179.95. Gadgets by Small, Inc., 40 West Littleton Blvd., #201-211, Littleton, CO 80120, (303) 791-6098.
CIRCLE 152 ON READER SERVICE CARD

Powerpoint, $295. Microsoft Corp., 16011 N.E. 36th Way, Redmond, WA 98073, (206) 454-2030.
CIRCLE 153 ON READER SERVICE CARD

No Atari ST programmer, novice or professional, should be without this manual!



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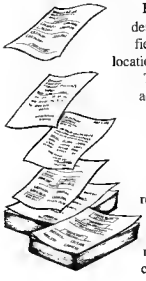
All the power of dBASE III+ and more for your Atari ST!!

dBMAN V, in a package of three separate functions: Database Management, Report Printing, and Program Development, is the only database management program which has all the power, flexibility, and capacity that you'll ever need!

At the Database Management level, *dBMAN V* allows you to structure, enter, retrieve, and modify data. At home, ***dBMAN V*** can keep track of your recipes, address book, video tape library, and more. In the office, ***dBMAN V*** can be programmed to manage your entire business including inventory control, payroll, invoicing, and billing.

At the Report Printing level, *dBMAN V* has an integrated, high-powered, and fully relational report writer that allows you to create reports in a flash with absolutely no programming!



Report layouts are designed by placing fields at the desired locations on the screen. This can easily be accomplished with the built-in cut, paste, and copy functions. The finished screen-layout reflects the printed output. From simple personal reports like recipe cards, mailing list, and video tape libraries, to complex business reports such as inventory count sheets, packing lists, employee payroll reports and customer billing statements are easily created.

At the Program Development level, *dBMAN V* is the only database manager for the Atari ST that is compatible with the dBASE III Plus language. With this awesome programming power, you can develop and customize any programs to fill your home and business needs. For your home, create a check book program, with complete bank statement balancing to manage your personal finances. For your office, customize a complete accounting system to fit your business needs.

Also available for ***dBMAN V*** is the high performance Greased Lightning compiler. This compiler fully supports macros, and executes dBASE programs up to 16 times faster than dBASE III Plus.

dBMAN is also available on Novell Netware, IBM PCNET, PC DOS, SCO Xenix, UNIX on NCR Tower, NEC ASTRA XL, Motorola 8000, Altos, Microport 286 and 386, Apple Macintosh, and Commodore Amiga.

dBMAN V's features:

- ✓ dBASE II and dBASE III Plus compatibility
- ✓ Easy-to-use, pull-down menu interface to create, add, edit, and report database information
- ✓ 320 programmable commands and functions
- ✓ Password protection and data security at field level
- ✓ Easily transport your dBASE III data files and programs between Atari ST and PC's
- ✓ Extensive data validation including range checking
- ✓ Single command menus: vertical, horizontal, scrollable and pull down menus
- ✓ User defined pop-up windows
- ✓ Create a GEM pull down menu, mouse menu and file selector
- ✓ Run GEM application from dBMAN
- ✓ Program debugger/editor. And more...

Report Writer features:

- ✓ 9 group levels
- ✓ Up to 255 columns and 255 lines per page
- ✓ Page headers, page footers, group headers, group footers, titles, summaries, and body lines
- ✓ Print labels up to 99 across
- ✓ Conditional printing of any items
- ✓ Compute running sums, counts, averages, minimums and maximums
- ✓ Relate and report from up to 9 database files with lookup (one to one) and scan (one to many) relations. And more...

Specifications:

- ✓ Field types: Character, Numeric, Date, Logical, Memo
- ✓ Maximum characters per field: 254
- ✓ Maximum number of records per database: 2 billion
- ✓ Maximum number of index files: no limit
- ✓ Maximum record size: 4000 bytes
- ✓ Numeric precision: 17 digits

System Requirements:

- ✓ Atari 520, 1040, or MEGA ST with one floppy drive and 480K free RAM.

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San Jose, CA 95118
Phone: 408-723-9044
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dBMAN V

VersaSoft's dBASE III+ Clone

BY DANIEL FRUCHEY

When I purchased my first ST three years ago I bought a simple database to keep track of addresses, audio tapes and software. Almost any database is sufficient for sorting this type of information.

But as I used my computer more, I found that I was changing databases repeatedly: one database had an unacceptable file size limit, another couldn't perform multiple sorts simultaneously, some couldn't import files from other formats—the list of shortcomings went on and on. When I finally did find a database I was happy with, the manufacturer left the Atari market and I was stranded. As I stretched my database's capabilities to its limits I ran into programming bugs and problems that eventually left me looking for another manufacturer that provided ongoing support.

There are currently seven or eight good database packages on the market. I've used about half of these with mixed results. This month I finally examined dBMAN V, VersaSoft Corp.'s solution to the database maze.

While dBMAN is not a new product on the ST, it is certainly improved. From the early days—when the only products on the ST were non-GEM programs ported over from the IBM—to the current version, VersaSoft has continued to support a fine product that promises flexibility few can match.

The ST implementation manual for dBMAN V is as slender as the screen display is simple, but don't worry: any good manual for dBASE III+ will tell you all you need to know.

dBMAN V Basics

The dBMAN V package includes three single-sided disks containing the program, sample files, help templates, and a program that will actually generate simple database source codes so you can manipulate your work.

Two paperbound manuals cover the extensive capabilities of the program and its advanced programming language. The first manual, an ST-specific description of the interface used by dBMAN V, includes a tutorial for creating simple databases. The second manual details advanced features available with all versions of dBMAN V regardless of the operating system used. It explains the programming language and provides examples of use, describes the functions of the Report Writer, lists error messages, and cross references related commands. Both manuals are well-written and carefully indexed.

dBMAN V runs on any ST or Mega in color or monochrome. At least 480K of RAM must be available to use dBMAN. If you own a 520ST, forget about using desk accessories or auto-load programs. You can use floppy drives, but the manufacturer recommends using a hard drive.

Although I found dBMAN V to be GEM-like, it does not truly use all the GEM functions familiar to ST users. When working with the interpreter you are mainly limited to keyboard input. When using some of the associated programs, such as the database generator, you can use the mouse and drop-down menus. The working screen is not contained within a resizable window like most GEM programs. However, you ▶

can access more than one database at a time.

Interpreter

The interpreter uses a split-screen format that allows the input of commands while results are displayed in the data window below. You can input commands directly in this way or write database source codes using your favorite word processor or the built-in text editor. The operating environment can be tailored according to your individual system requirements, so many of your selections only need to be made when you first run the program. By editing an ASCII file you can define the configuration of parameters such as memory variables, picture and file buffers, file paths and more.

The interpreter provides a versatile, extremely powerful programming language that lets you expand your databases into application programs that can be quite complex. (For example, SBT's excellent accounting software is compiled dBMAN code.) Once database formats are established you can perform simple sorting functions for lists and reports. If you need more power you can establish advanced relationships between pieces of data and automate virtually any procedure or series of commands.

dBMAN V lets you enter up to 254 characters in each field and can store up to 2 billion records per database. You can define five different types of fields including character, numeric, logical, and memo. The memo fields can be quite extensive with up to 65,000 characters. While I find it difficult to envision a situation where a user will need 2 billion records in a single database, the message is that dBMAN V is built to meet the needs of the business user, as well as the home user.

The dBMAN V Interpreter uses 320 extended commands that give you power over your data and the computer operating system. While it was impossible for me to test all of the program functions, you should know that dBMAN V includes a programmable GEM interface, scrollable windows, creation of pull-down menus, a multi-user interface, debugging and help functions, password protection and data encryption, unlimited file indexing, free-form page layout for generating reports and an integrated report generator.

dBMAN V lets you process accounts receivable information, control inventories, create billing systems, and automate payrolls. Once you have created a database, you can save it as a stand-alone program using the optional Greased Lightning! compiler. Compiled databases and applications can run up to 16 times faster than those created with dBASE III Plus on the IBM.

I found the Interpreter a little intimidating at first. I am not a programmer, and I feared that dBMAN V might get the best of me. However, this wasn't the case. Using the tutorial from the manual I created my first database within half an hour. The second and third databases came within minutes.

There is nothing that says you must use all the power and versatility available with dBMAN V your first time out. It's like owning a sports car: There's more power under the hood than you need, but it's nice knowing that it's there.

If you wish to access files generated on IBM computers, you can import data from dBASE II, dBASE III Plus, VisiCalc, Lotus 1-2-3, and similar programs. Since many applications are created using these formats, dBMAN breaks down a barrier that has kept many users from shifting to STs.

Report Writer

VersaSoft describes the Report Writer as a "fully relational multi-level report generator." In simple English, this means you can create complex report formats with little or no programming.

A report can be defined as any output of sorted or collated data. A report may consist of mailing labels, a disk file, pages of lists, form letters, invoices or any other form of output you desire. dBMAN V's Report Writer is flexible enough to allow all of these.

You can relate and report data from up to nine databases at once, freely adjust the format of output, control the output device, use up to nine grouping levels in a report and more.

Assist

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Summation

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Dan Fruchey is START's desktop publishing columnist. He works as a paramedic in Santa Rosa, California and runs a small clip-art business on the side.

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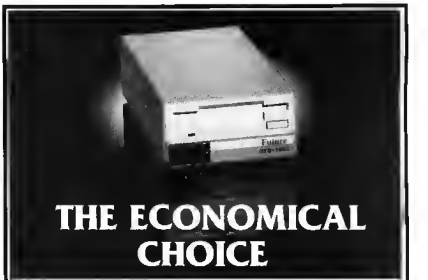

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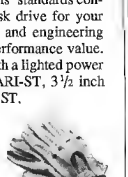

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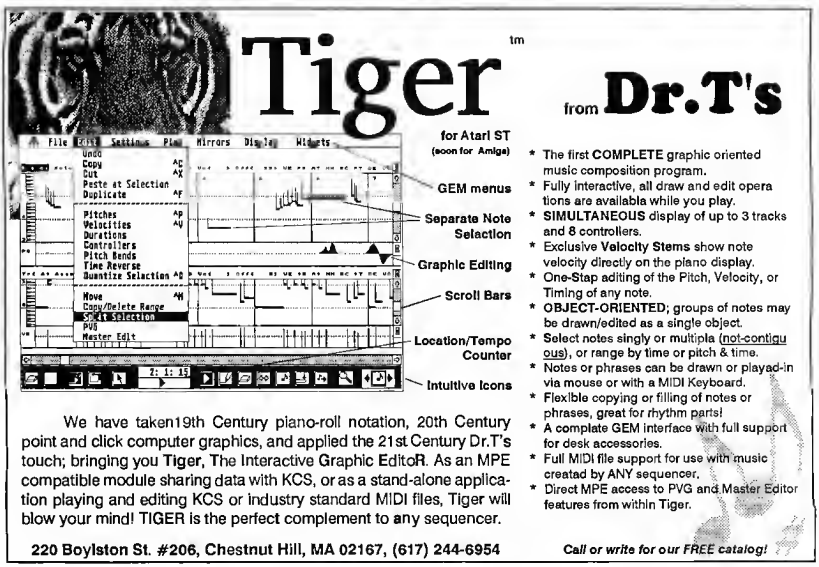
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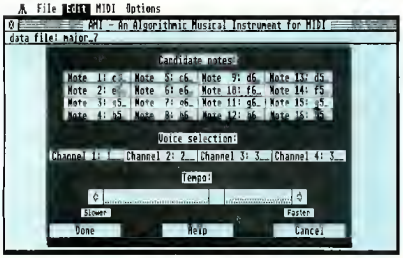
Saturday Night's All Right For Downloads

BY JIM PIERSON-PERRY
START MUSIC/MIDI EDITOR



AMI, the four-part musical composer, set up to play in a major seventh motif. Of the four voices generated, one each goes to MIDI channels 1 and 2 while the last two are played on channel 3.

This month we will take a look at some of the better MIDI application programs that can be found on most bulletin boards. They run the gamut of uses from sequencing to music composition at different levels of sophistication. But first, some news items of interest.

Hybrid Arts Comes Through

With the newest versions (January 1989) of their MIDI Track sequencers, Hybrid Arts has made good on their promise to provide MIDI file capability. Their sequencers can now load and save MIDI files directly (formats 0 and 1)—they can even handle those created on a Mac that have a MacBinary file header. Also, a public domain version (MIDIMOVER.ARC) has been released to bulletin boards everywhere that converts between MIDI file and Hybrid Arts file formats (.SNG) and includes simple playback abilities. This opens up the Hybrid Arts family of MIDI applications (such as EZ-Score Plus for scoring and Ludwig for composition) to musicians who use sequencers from other companies.

New Players

Two more established Mac MIDI software developers have turned their attentions to Atari. Kurzweil will port its Object Mover editor/librarian for the K1000 and compatible sound modules. Opcode Systems will release a patch editor for the new Proteus instrument from E-mu, a big hit at the Winter NAMM show.

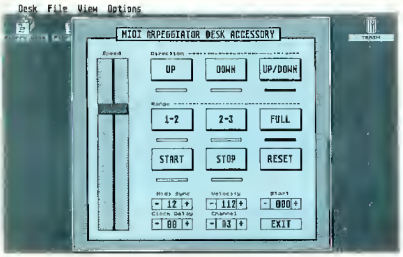
Reversing this trend, two ST developers have begun porting their programs to other computers. Dr. T's Keyboard Controlled Sequencer (KCS) has been released for the Mac and Amiga, while Midisoft has taken their Midisoft Studio sequencer to the IBM (under GEM, naturally).

Higher Education

Looking for a break into the electronic music instrument service job market? The NRI School of Electronics offers a home study course on electronic music technology. It includes an Atari 520ST and Casio CZ-101 as part of the course materials. The course covers electronic and music theory, MIDI, microprocessors, sampling, recording techniques and more—even to actually building your own four-input mixer.

BBS MIDI Programs

What can you find on bulletin board systems for MIDI? Quite a lot, actually, ranging from song and sound data files ▶



The desk accessory arpeggiator. This example is for a large note series being played in up and down cycles. The playing speed is fast enough to make even Keith Emerson breathless but my ST won't even break a sweat.

to educational efforts, composing tools and indispensable utilities.

There are also many demo versions of commercial programs. Given the cost and complexity of some of these applications, it is especially valuable to be able to look them over at your leisure using your own MIDI system. Often all features are functional except file saving. Examples include virtually all of the Hybrid Arts product line, M and Real-Time from Intelligent Music, Tunesmith from Dr. T, Master Track Pro from Passport Designs, Pro 24 III from Steinberg/Jones, Tweak It! from Savant Audio and Super Score from Sonus.

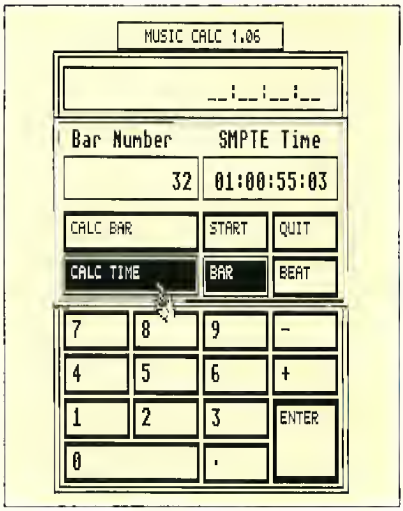
Listed below are descriptions of several particularly good programs I found on CompuServe, GEnie and PAN. Unless otherwise noted, they are all ARC files and work with all ST/Mega models using medium or high resolution. These were chosen to represent different types of applications at different levels of user ability. I deliberately avoided instrument-specific librarians/editors to make the examples as general as possible. For those interested, I quickly found librarian/editor programs that handle DX7, DX21/27/100, TX81Z, FB01, MT32, ESQ-1, K1, DW8000 and CZ-101 synthesizers.

POLKSEQ: This is a very simple one-track sequencer—record and playback. It's a solid first program for the MIDI novice. Even more useful is that the source code was written in GFA BASIC and is available (from MichTron's RoundTable on GEnie) to study. It was designed for a color system and the screen looks odd in monochrome, but the program itself works.

STMIDIEX: This is the public domain librarian program of choice. It can receive any sysex data your equipment can send (such as patch data or drum machine patterns) and save it to a file. You can save multiple data sets in a single file which you can send over MIDI to configure your entire instrument setup in one shot. The files use the MIDIEX format originally developed for IBM computers and are completely cross-compatible. Many MIDIEX patch files are on bulletin boards, particularly for the DX7. This program was also designed for a color system, so the screen layout looks odd in mono.

AMI: Moving from the pragmatic to the esoteric, AMI is an introduction to algorithmic music generation. Working from a set of 16 notes, it generates four-part harmonies that can be on up to four different MIDI channels. The nature of the music depends on your choice of notes; several different example data files are included to get you started. This program is highly addictive, simple to use but capable of very pleasing results. It is reminiscent of the old Stereo Chord Egg that PaIA Electronics used to offer.

ARPEG: Here is another addictive



The music/time calculator shown computing the SMPTE time corresponding to measure 32 of piece with a preset tempo and time signature.

diversion, a desk accessory arpeggiator. You enter a set of notes from the MIDI keyboard and it runs through them over and over again. Variations are to cycle up and down the keyboard or to go in only one direction. The playback rate is variable over a wide range and can synch to an external clock. If you have access to a hardware sequencer, such as those built into many of the newer instruments, you can capture the notes' data and replay them into your favorite ST sequencer (this also works with AMI).

MIDITALK: One of the most important utility applications is to monitor the MIDI data stream, especially when some equipment is not responding properly. MIDITALK does that and also lets you send MIDI messages from your ST keyboard. This lets you use the program for several purposes: educational, troubleshooting and even as a generic librarian. You can define strings of MIDI messages as macros for more efficient operation.

MUSICALC: Ranking high on the specialty utility list is this gem for dealing with several time-related music problems. Given the tempo and time signature, it can convert between bar or beat number and the corresponding SMPTE time (all four SMPTE versions are supported). You can enter tempo directly as beats per minute, or it can be determined by the rate at which you tap the spacebar. Delay times for common note durations can be displayed for the given tempo. Other functions include stopwatch mode, 24-hour clock time calculations, metronome and even basic math calculations.

EARTRAIN: Okay, this is general music and not MIDI, but it's so good that I have to mention it. It trains you to recognize note pitches from the major, minor, chromatic or pentatonic scales using an arcade game approach. The use of graphics, sound and overall screen layouts are excellent—even down to the use of a cartoon Mr. T as your instructor! Several levels of difficulty are provided. Note: the program only runs in low resolution. ■

Music/MIDI Editor Jim Pierson-Perry is a research chemist and semi-professional musician who lives in Elkton, Maryland.

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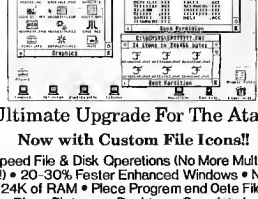

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After-Market Floppy Disk Drives

Future Systems' GTS-100, PCM's FD-1

BY TOM BYRON
START ASSOCIATE EDITOR

If your ST has only one disk drive then you've experienced the frustration that comes with copying disk files—the constant disk swapping when you want to copy even one file can be maddening. A RAM disk can help streamline things, but that eats up the ST's memory, memory that's better used for other things. After a printer, I have found that an external floppy disk drive is the most important peripheral to have.

Two new 3½-inch floppy drives have recently entered the ST market that will make accessing and copying disks easier at a price that is in line with typical ST hardware: the Professional FD-1 from PCM Industries and the GTS-100 from Future Systems. Both drives are double-sided/double-density and support up to one megabyte of storage.

The designers at Future Systems were working overtime when they developed the GTS-100. The slick, black case and smooth, efficient operation make this disk drive a must-have. And a handy LED readout tells you the track number being accessed.

The Professional FD-1

The Professional FD-1, from PCM Industries, is a 720K drive that will read/write up to 83 tracks and is compatible with all STs and Megas. The FD-1's design is modest but attractive, and the drive itself is very, very quiet. The drive is housed in a compact metal case that measures 1½ by 4⅛ by 7⅞ inches, and its extra-long cable lets you position it along either side of your ST. PCM has capped its product with a one-year warranty.

Installing the FD-1 is easy; just remember to turn off all hardware before you install or remove *any* cables to or from your computer—you don't want to damage any of its delicate internal circuitry. Now plug the power cord into the rear of the FD-1, then plug the FD-1's drive cable into the external drive port in the back of your ST. (Note that since you cannot detach the drive cable from the rear of the FD-1, it can be a second (B) drive only.) Now plug the power supply into the nearest outlet, and *voila!*—you now have an external floppy-disk drive.

If your ST predates the STFM versions, then you have only an external drive. If this is the case, plug the FD-1 into the second drive port in the back of your A drive, instead of into the ST.

As I said, the FD-1 is very quiet—I'd hardly notice it was there if I didn't use ▶

it so often. And you won't hear the clicking and whirring you may have noticed in your current drive. If you're wondering whether the FD-1 will speed up your ST, the bottom line is that it won't. START Programs Editor Heidi Brumbaugh wrote a simple program in GFA BASIC 2.0 to measure disk-access speed and we used it to test the FD-1. The results are summarized at the end of this review.

Having used the FD-1 for over a month now, I have experienced two problems with it, one minor and one not so minor. The not-so-minor one has to do with disk formatting. Once in a while I've found that the FD-1 doesn't format double-sided disks completely. I usually don't find this out until I attempt to save something on the disk I thought I formatted, and then get a message that the disk "may be damaged." (PCM is aware of the problem, however, and has corrected it.) I experienced no trouble formatting single-sided disks.

The second problem is that the FD-1's cable doesn't seem to want to stay in the ST's external drive port; it has a tendency to fall out from time to time. This doesn't happen that often, but it happens often enough for me to be concerned. PCM has also promised to correct this problem.

Other than the problems I've mentioned, the FD-1 is a good product. It is simply what it says it is—an external drive for your ST that works and works well.

Constant disk-swapping with one drive can be maddening.

The GTS-100

The GTS-100 from Future Systems is also a double-sided, double-density 720K disk drive. Its slick, black design includes an LED readout that tells you which track number is being accessed. It also has two separate lights that tell you when the power is on and when the drive is busy. The drive measures 2¼ by 4¼ by 8¼ inches. And, like the FD-1, it is also very quiet.

Also like the FD-1, installing the GTS-100 is very easy. Again, turn everything off before you begin. The GTS-100's disk cable is detachable, and in the rear of the drive you'll see two ports: INPUT and OUTPUT. Plug one end of the drive cable into the ST's drive port and the other end into the drive's INPUT port. The OUTPUT port is there in case you wish to add yet another drive.

The GTS-100 is touted as Future Systems' top-of-the-line drive, and it's easy to see why—it's good-looking and after a month of use has manifested no significant problems. Future Systems also manufactures the GTS-100X, which costs less and doesn't include an LED readout. See below for the disk-access speed results of the GTS-100.

The Professional FD-1 from PCM industries is a double-sided, double-density floppy-disk drive that is quiet and efficient. In fact, it's so quiet you'd hardly notice it was there.

The Need for Speed

If you're looking for a faster disk drive than the one you already have, you won't find it here. Both the FD-1 and the GTS-100 appear to be as fast as any other disk drive available, external or internal. Both the FD-1 and the GTS-100 were tested against Atari's SF314. We found that all disk-access speeds fell within one percent of each other.

A test for drive RPM also showed no differences. I used Dave Small's drive-speed tester from START Special Issue Number Four. Both the FD-1 and the GTS-100 tested at the ST-standard 300 RPM.

The Bottom Line

The bottom line is that if you're tired of constant disk swapping, you need a second disk drive. Or if your present drive is on its last legs, then you'll want to invest in another.

Both the Professional FD-1 and the GTS-100 are good buys. Both are quiet and efficient. The FD-1 is innocuous and gets the job done; the GTS-100 is certainly slicker looking but does the same thing, with no significant difference in speed. Ultimately, it depends on your budget. ■

PRODUCTS MENTIONED

Professional FD-1, $199.95. PCM Industries, P.O. Box 5772, Arlington, TX 76050, (214) 660-4780.
CIRCLE 167 ON READER SERVICE CARD

GTS-100, $279.95, **GTS-100X**, $239.95. Future Systems, Inc., 21634 Lassen St., Chatsworth, CA 91311, (818) 407-1647.
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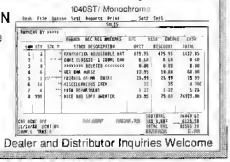

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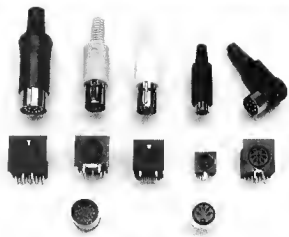

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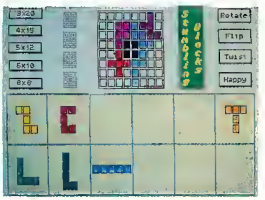

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Spring into Motion!

This issue's lead program is a complete interpreted programming language. **Pogo** by Jim Kent incorporates Logo's turtle graphics and a unique approach to multi-processing that makes Pogo ideal for graphic simulations and games. Even if you're not a programmer, be sure to un-ARC Pogo to see the demos and play the games we've included as sample programs. If you're a C programmer, the Aztec source code to Pogo is on disk so that you can add your own functions. Files POGO.ARC and POGOSRC.ARC; runs in medium or low resolution.

File Search is a new, indispensible utility from David Jarvis. This desk accessory will help you find any file on your hard disk (or stack of floppies). It accepts wildcards and lets you browse, copy, delete, rename or print the file it finds. File FSEARCH.ARC; runs in any resolution.

Hard disk owners, beware: File Search may exceed the ST's 40-folder limit for folder access. If you don't already have Atari's fix for the problem, **FOLDRXXX**, it is on this issue's disk and may be freely distributed. File FOLDRXXX.ARC; runs in any resolution from an AUTO folder.

This month START presents a challenging puzzle game called **Stumbling Blocks**. Written by Mark Annetts, Stumbling Blocks will entertain you for hours as you try to fit the 12 shapes into a 60-square grid. Try the 8-by-8 puzzle for a strategic two-player game. Files STUMBLE.ARC and STUMBDAT.ARC; runs in low resolution.

Cyber fans, learn advanced Cyber Control techniques by studying Dann Park's **Splines on Splines** demo. Achieve the "slow in, slow out" motion effects used to create the famous Visitor animation. File SPLINES.ARC; requires Cyber Control and CAD 3-D version 2.0 or higher.

Should you buy a car or can you save money by leasing? This month's Business Applications column by Christoph Herd is accompanied by a **buy/lease spreadsheet template** to help you decide. Load this .WKS file into any ST spreadsheet that can read Lotus 1.0 files and plug in your own numbers. File BUY-LEASE.ARC; requires a Lotus-compatible spreadsheet. ■

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Disk Instructions

How to Get Our Programs Up and Running

Each article in this issue with a disk icon next to its title on the Table of Contents or "On Disk" on its first page has an accompanying file on your START disk. These files are *archive* files—they've been *compressed* with the Archive Utilities Set, or ARC, a public domain program available for many personal computers. We use the ARC utility to squeeze the many files that may go with a particular article into *one* compressed file, which may be only 40 percent the total size of the original files.

In addition to the archive files, you'll find the program ARCX.TTP, which stands for ARChive eXtract, on your START disk You'll use this program to *decompress*, or extract, the disk files we've shrunk down with ARC.

All programs on your START disk are copyrighted They are for your own private use, and are not public domain.

Getting Started

To use the files and programs on your START disk, please follow these simple instructions. You'll need two blank, formatted single- or double-sided disks to properly extract the files.

Your START disk is not copy-protected and you should make a copy of it *immediately* to the first blank disk. Make sure the write-protect window is *open* on the START disk at all times to insure that you don't accidentally erase the disk.

Note: If you are unsure how to format a disk, copy a disk or copy individual files, please refer to your original Atari ST or Mega manual and study these procedures carefully before going on.

After you've copied your original START disk, store it in a safe place and label the copy disk "START Backup."

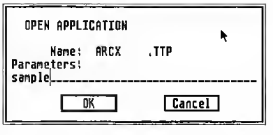
Now, put your START Backup disk in Drive A of your computer and double-click on the Drive A icon to see the disk's contents.

Un-ARCing the Files

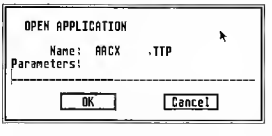
To use START's compressed disk files, please follow these steps:

1. Copy the ARCed file you wish to use and the program ARCX.TTP from your START Backup disk onto your second blank formatted disk When you're finished, label it *Un-ARC disk*.

2. Now you'll extract the compressed files from the ARC file you just copied Insert your Un-ARC disk into Drive A. If the Drive A window is already open on the Desktop, you can press the Escape key to see the new disk directory. Otherwise, double-click on the Drive A icon to see the directory Double-click on ARCX.TTP. The following dialog box will appear:



3. Type in the name of the ARC file you just copied over to your Un-ARC disk and press Return You do *not* have to type in the extender .ARC. You can type in the name in upper or lower case.



(Note: If ARCX.TTP can't find a file, it may be because you have misspelled the name of the ARC file. You must type the filename *exactly* as it appears in the directory.)

4. As the program runs, it will display the names of the individual files as it extracts them, similar to the example below.

```
Archive: SAMPLE.ARC
Extracting file: EXAMPLE.PRG
Extracting file: FILE.TXT
Extracting file: SAMPLE.PIC
Extracting file: README
```

When ARC has successfully extracted all the files, it will return to the Desktop and you will see the original files within the directory window, along with the archive file and the ARCX.TTP program. You may now use any of the START files as you wish, just follow the instructions in the appropriate article in this issue.

To use any other archive files on your START disk, simply repeat the above procedures. Be sure you begin each time with a blank, formatted disk.

In addition to the runnable programs, some ARC files may also contain source code listings or an ASCII text file (called BREAKDWN.TXT, for example) which describes the program's structure. You can examine such a file from the ST Desktop by double-clicking on its icon and then clicking on Show (to see it on the monitor) or Print (to print it out). ■

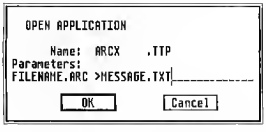
Clipboard

Tips and Tricks for the ST Owner

Compiled by Heidi Brumbaugh
START Programs Editor

Redirecting TTP Output

You can redirect the screen output of many TTP programs to a file. At the "Open Application" dialog box, type the usual filename parameter, a space, a greater-than sign (>) and a filename:



Do *not* put a space between the greater-than sign and filename. The advantage to this is that TTP programs often flash messages only briefly on the screen—too quickly for you to read. Outputting these messages to a file lets you read the file from the Desktop at your leisure.

This works particularly well if you're having troubles with ARCX.TTP. (Hint: if you return to the Desktop and there is no message file, the problem may be that the disk is write-protected or full.)

At first we thought this was a hidden feature of TOS; however, it turns out that this feature is implemented by the C compiler that compiled the TTP program. The command line is output using the C statement printf(); since the greater than sign is a printf formatting character it is treated as such.

Because different C compilers handle this case differently, this tip may not work on all TTP programs.

Those Pesky Gadgets

GEM windows have three buttons, sometimes called gadgets, that control the size of the window. The full box, in the upper right corner, expands the window to the size of the screen. The close box, in the upper left corner, closes the window (and in many cases quits the accompanying appliction). The size box, in the lower right corner, adjusts the size of the window; click here and move the mouse, holding down the left mouse button.

How Long?

Pressing [Alternate]-[=] in ST Writer Elite gives you the current cursor position in bytes from the start of the file. This quick feature can give you a byte count of the entire document by moving the cursor to the end of the file. This is more accurate than a saved file byte count, since it doesn't include the ST Writer "Do Run Run" header.

Hidden Attributes

Universal Item Selector II lets you change a file's attributes; this gives you a useful way to hide a file. Drag the file to the check mark on the lower right side of the file directory window. A dialog box will appear, letting you click on the attributes you want. A hidden file will not show up in a directory; however, it will show up using UIS II's Find feature (type in the filename and click on F).

To un-Hide (or Show) a file, type in the name of the file you want to un-Hide while you're in the directory or folder where the file appears, then drag it to the check-mark box. When the dialog box appears, click on the Show option and then on the OK box.

You can also Hide or Show more than one file at a time by creating a Mask, i.e. a pattern such as *.DAT and then treating it like the name of a single file.

Just a Comment . . .

GFA BASIC won't let you exit a line that has a syntax error, but there are times you want to skip the problem and come back to it. Simply move to the beginning of the line by pressing [Control]-[Left arrow] and then enter an apostrophe. This will comment out the line so GFA won't notice the syntax error. When you fix the problem later, be sure to remove the apostrophe.

The Enterprise's First Mistake

In a recent episode of Paramount's syndicated series *Star Trek—The Next Generation*, the Enterprise's computer was invaded by a probe which threatened to graft a new program onto the ship's systems. It wasn't until the end of the show, just as the Enterprise was on the verge of destruction, that Chief Engineer Geordi LaForge discovered that all he needed to do was restore the computer's data from the last backup made before they encountered the probe.

Of course, if Geordi had been reading back issues of the Clipboard, he would have known all along that all he needed to do was reboot to get rid of that nasty virus. . . .

Got an ST trick or tip to share? Send it to the Clipboard, 544 Second Street, San Francisco, CA 94107. ■

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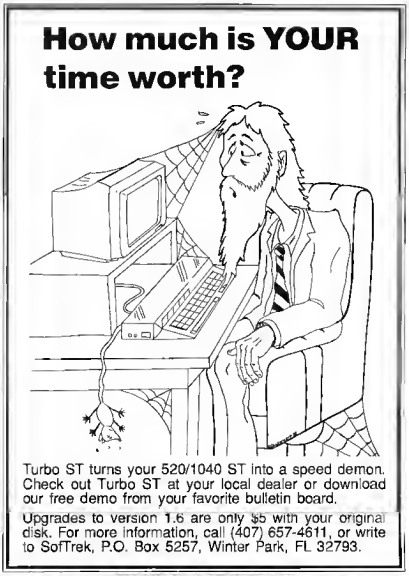

CIRCLE 078 ON READER SERVICE CARD

Tools of the Trade

Programming Languages Explored

BY CHARLES JACKSON
START Charts compiled by Morto Deike, START Editoriol Coordinotor

Programming is like any other craft; in order to get a job done right, you need to use the right tools. And the most important tool a programmer has is a language—a way to get an unambiguous series of instructions to the computer's central processor. In this article, Charles Jackson examines computer languages and discusses which are best suited to which tasks.

In the earliest days of computing, programmers had no choice of languages: a program was hard-wired—physically—into a computer. To change a program, a programmer had to remove the existing connections and add new ones. It was an arduous and painstaking task.

When computers became a bit more sophisticated, programmers were able to write programs in machine language and pass the instructions to the computer via punch cards. Then Fortran, COBOL and other *higher level* languages appeared on the scene—so called because they were one step removed from machine language. Other languages that appeared later, such as BASIC and Pascal, were originally designed to teach programming but evolved into powerful programming tools in their own right.

Now, programmers can choose from a wide range of languages—each best suited to a different task. Which language you should use for an application depends on what your program will be designed to do. The START Charts accompanying this article will give you up-to-date information on ST language implementations, including version numbers,company addresses and prices.

C

Since its introduction in the early 1970s, C has become the software developer's language of choice. Having only 32 reserved words, C is a small, flexible language that combines the power and portability of high-level structured languages with the speed and efficiency of low-level assembly languages. There are C compilers available for nearly every brand and type of computer from 8-bit Ataris to Unix mainframes.

This portability makes C a leading choice for developing networking software for local and wide area networks (LANs and WANs), particularly for networks designed to join different brands of computers. Some software engineers rely heavily on C, reserving assembly language for such operations as time-critical computations. A descendent of a programming language called B, C was developed in the early 1970's by Dennis Ritchie at AT&T Bell Laboratories.

At the time Unix was written, most operating systems were written in assembly language, thus chaining the operating system to the machine for which it was written, but more than 90 percent of Unix was written in C. This has enabled Unix to be ported to many different types of computers.

The C Programming Language by Brian Kernighan and Dennis Ritchie, is the definitive reference manual for the language. Often called simply the "K and R," this 220-page manual has been guiding C programmers for more than 10 years.

C for the ST

Product	Price	Ver.
C Mark Williams Upgrade policy varies; call Mark Williams.	$179.95	3.0.9
C Prospero Software To upgrade send in original disk.	$199	1.13
Laser C Megamax To upgrade send in originol disk + $10 (+$3 s/h).	$199.95	2.0
Aztec C Manx Upgrade policy varies; call Manx.	$199	3.6
Alcyon C Atari Corp. Upgrade for registered developers only.	Call Atari	none
HiSoft C	Scheduled for Release In May	

Assembly Language

Assembly language is a machine-specific, low-level language. Each instruction can be translated quickly into one or two bytes of machine code. And with a little more effort, a machine-language program can be translated into assembly language source code.

Assembly language programs run fast and are invaluable for time-critical operations. Assembly language programmers know exactly how many machine cycles each instruction requires and can write routines that run with split-second precision.

Assembly language programs run fast and are invaluable for time-critical operations.

On the down side, assembler source code is long and not very readable. A one-line PRINT statement in BASIC, for example, would require about a dozen assembly language commands.

Macro assemblers make programming somewhat easier. Macro assemblers let you extend your assembly language package to include any assembler subroutines you write. You could write a PRINT macro, for example, that would print information on the screen. This PRINT macro would contain the dozen-or-so assembler instructions you need ▶

to print something on the screen. Once defined as a macro, though, you can call PRINT each time you want something printed on the screen. When you assemble the program, the assembler will expand each occurrence of the macro into its original, unabbreviated form. Seasoned assembly language programmers often have collected large libraries of macros.

Assembly language is slipping in popularity. Faster machines and high-level languages such as C and Modula-2 are making assembly language nearly obsolete in all but the most time-critical applications.

Assembly Longuoge for the ST

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AssemPro Abacus To upgrade send in original disk + $15 (+$2 s/h).	$59.95	1.0
GFA Assembler Antic Software Upgrade policy varies; call Antic.	Call Antic	1.2
MadMac Upgrade for developers only.	Coll Atari	

BASIC

BASIC (Beginner's All-purpose Symbolic Instruction Code) is a computer language developed in 1967 at Dartmouth College by John Kemeny and Thomas Kurtz. BASIC is an interpreted programming language—you get immediate response to what you type at the terminal. Designed for beginning programmers, BASIC is one of the easiest languages to learn. Newer, more powerful versions are commonly seen in microcomputers; the most powerful BASICs for the ST don't require line numbers and offer support for structured programming

BASIC for the ST

Product	Price	Ver.
HiSoft BASIC MichTran	$79.95	1.23
HiSoft BASIC Pro. MichTron	$159.95	1.23
GFA BASIC Antic Software Upgrade policy varies; call Antic.	$99.95	3.05
ST BASIC Atari Upgrade policy varies; call Atari.	$29.95	D

Modula-2

Modula-2 was introduced in 1985 by Swiss professor Niklaus Wirth. Programmers unfamiliar with Modula-2 often look at the Pascal-like appearance of Modula-2 source code and dismiss the language as a "warmed-over" Pascal.

Although many Pascal and Modula-2 programs look alike, the applications for which they were designed are quite different. Wirth developed Pascal to teach programming skills. He developed Modula (now called Modula-1) and Modula-2 for real-world programming jobs.

Modula-2 is a general-purpose high-level programming language that combines the readability of Pascal with the strength of C, and then some. More and more programmers are finding Modula-2 to be slightly more powerful than C. Modula-2 features both multi-tasking and multi-processing capabilities. It is used for writing compilers, operating systems and application programs.

It has also become an efficient development tool. Modula-2 lets you break large programming projects into separate pieces, or modules, which may then be distributed among several teams of software engineers. Modula-2 lets these teams work independently of each other so that smaller program modules can be designed, tested and debugged before the larger modules are complete.

Modula-2 is a small language—only 40 keywords—and is very portable. Modula-2 source code written on your ST will often run on mainframe systems. Modula-2's secret is external I/O (input/output) libraries. Like C, Modula-2 doesn't have its I/O routines hard-wired into the language. These I/O functions, usually the most machine-dependent elements of a language, are stored in separate library files. As long as your source code is compiled and linked with the appropriate I/O library, it should operate on nearly any machine.

Modula 2 for the ST

Product	Price	Ver.
Modula 2 ana-systems Modula 2 is supported on BBS	Shareware	1.0

Pascal

Pascal, named for the mathematician and philosopher Blaise Pascal, is a high-level compiled computer language designed by Niklaus Wirth at Zurich in 1968. It was never designed for pro-

gramming, but for *teaching* structured programming. The first Pascal compilers didn't appear until the early 1970s.

Based on ALGOL (ALGOrithmic Language), Pascal was designed to be a small, easily learned, machine-independent language. As one of the first languages to use control structures such as BEGIN and END, its syntax demanded a rigid, structured approach to programming. Towards this end, Pascal provides a rich variety of data types, including abstract and user-defined data types.

Pascal for the ST

Product	Price	Ver.
Pascal far GEM Prospero Software To upgrade send in original disk + $39.	$149	2.14
ALICE (Pascal) Looking Glass Software To upgrade send in original disk + $15.	$79.95	1.5
Personal Pascal ICD To upgrade send in original disk + $10.	$99.95	2.05
UCSD Pascal Pecan Software To upgrade send in original disk + $79.95	$249.95	4.22

Unfortunately, Pascal is weak in arithmetic. Standard Pascal lacks an exponential operator and insists that loops may not be incremented or decremented by any number but 1. Extensions to Pascal have solved this problem; however, many of these extensions are not compatible with all Pascal compilers and will not run on all machines.

FORTRAN

FORTRAN (**FOR**mula **TRAN**slation language) was one of the first computer languages designed to be machine-independent. Developed in the mid-1950s by IBM as a tool for simplifying scientific programming, FORTRAN lets programmers write program code that resembles algebraic notation. As one of the oldest computer languages, it is still one of the most widely used for technical programming and teaching.

FORTRAN is a high-level compiled language which efficiently handles lengthy scientific computations. As a result, math-intensive programs written in FORTRAN require relatively little computer time. The American National Standards Institute (ANSI) first standardized the language in 1966. Newer versions of FORTRAN include IF-THEN-ELSE blocks and CHARACTER data types.

FORTRAN for the ST

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Pro-Fortron 77 Prospero Software To upgrade send in original disk + $59.	$199	2.14

APL

APL (**A** Programming **L**anguage) is an interpreted computer language developed at IBM by Kenneth Iverson in 1962. Iverson's book, *APL*, is still the definitive text on the language. Like Pascal, APL was not developed for programming, but for teaching programming concepts.

At first glance, it's difficult to read and understand an APL program. Standard APL is read from right to left and uses special symbols such as inverted triangles, boxes and arrows in place of keywords and commands. (You need a special keyboard to enter these symbols.) For these reasons, APL has been called a "write-only" language.

APL also requires more memory than most BASIC interpreters and FORTRAN compilers and is most commonly found on larger computers.

A 20-line FORTRAN program could be written in 15 *keystrokes* in APL.

Once you've become familiar with APL, though, you can write extraordinarily powerful programs in a line or two of code. APL instructors often hold programming contests, awarding prizes to the student who can write the most powerful APL program in a single line of code.

APL's power comes from its use of arrays—nearly every element of an APL program is considered an array, and all of APL's operators are designed to work with single- or multi-dimensional arrays. Consider a program which multiplies two 100-by-100 matrices together, then prints the sum of all the elements ▶

APL for the ST

Product	Price	Ver.
APL.68000 Spencer Organization Upgrade policy varies; call Spencer	$149	6.05 C

in the resulting matrix. A sharp FORTRAN programmer could write this program in about 20 lines of code. An *average* APL student could write the same program in 15 *keystrokes.*

FORTH

FORTH is a medium-level interpreted language that combines the speed of low-level languages with the readability of high-level languages.

Charles More created FORTH to control telescopes at Kitt Peak Observatory.

FORTH for the ST

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Forth/MT Abacus Software To upgrade send in original disk + $15.	$49.95	1.0
4xForth Plus Dragon Group To upgrade from 1.1 send in registration card.	$69.95	3.03

FORTH was created to control telescopes at Kitt Peak Observatory.

FORTH programmers write their own commands (or functions), which are then used repeatedly in writing new programs. Thus, it is an economical language that uses a small number of subroutines to build an entire program.

LISP

Lisp (**LIS**t **P**rocessing) is a high-level interpreted language used to study and develop artificial intelligence applications. Designed by John McCarthy in the late 1950s, Lisp became popular with researchers at MIT, who used it to study properties of artificial intelligence. Lisp is an interactive language in which you create complicated command lists by combining a series of related words, called "S-expressions" (short for "symbolic expressions"). An S-expression can be an atom (a single word or number) or a list of atoms enclosed in parentheses.

As an associative language, Lisp doesn't rely on specific memory addresses. References to specific pieces of information are made by partial descriptions of their contents. The procedure is very similar to using an index or telephone directory; if you have a piece of the information you need, Lisp helps you find all list entries which contain that piece. One of the best introductory texts to the language is *The Little Lisper*

Lisp for the ST

Product	Price	Ver.
X-LISP	Public Domain	

Prolog

Prolog, (**PRO**gramming **LOG**ic), is a high-level language commonly used for expert systems and artificial intelligence applications. Prolog was designed by French computer scientists in the early 1970s and was selected as the language of choice for fifth-generation computers.

Like Lisp, Prolog is a symbolic language. It uses words (called "atoms") to represent and manipulate concepts.

Prolog for the ST

Product	Price	Ver.
Extended Prolog Rational Vision No further upgrades planned.	$39.95	4.1

Logo

Logo is a high-level interpreted language developed in the 1970s by Seymour Papert of MIT. Like Pascal and APL, Logo was designed to teach programming concepts. Papert, however, had a very different audience in mind. Logo was developed to introduce children to programming concepts. Using sound, color and turtle-shaped cursors, Logo develops a child's creativity, planning and problem-solving skills.

The earliest versions of Logo controlled a simple, dome-shaped robot. Students pasted a tail to the back of it and called it a turtle. Later versions depicted a triangular cursor that could draw simple pictures. Current implementations use several turtle-shaped cursors which can be programmed to draw multi-color pictures.

Much more than a vehicle for artistic amphibians, Logo is a very close relative of Lisp. If you're familiar with Lisp, you can learn Logo in a day or less. Once we leave the turtles, Logo's command set looks and performs very much like its Lisp counterpart.

See Seymour Papert's *Mindstorms* for a detailed look at the theories and concepts behind Logo.

(*Editor's Note:* Logo was shipped with the earlier versions of the ST; however, Atari is no longer supporting this product.)

COBOL

COBOL (**CO**mmon **B**usiness **O**riented **L**anguage) is a popular high-level compiled language used widely in businesses. Developed in the late 1950s, it

was one of the first languages designed to run on a variety of machines.

COBOL statements are written in abbreviated English. A sample statement might look like this:

MULTIPLY TIME-SPENT BY VELOCITY GIVING DISTANCE ROUNDED

COBOL statements are easily understood but produce mammoth listings.

Such statements are easily understood but produce mammoth listings. Back in the days of Hollerith punch cards, the APL programmer could carry a program in a shirt pocket; the COBOL programmer needed two or three large boxes

A COBOL program has four parts: an Identification Division, an Environment Division, a Data Division and a Procedure Division. The Identification Division is one line which contains the name of the program. The Environment Division links the Data Division and the Procedure Divisions with whatever equipment will be used (such as disk drive C:\ or Laser Printer #5). The Data Division names all the files to be used in the program, and also describes the file format. The Procedure Division contains the instructions to be performed.

If Done, Then End Article

Just as human languages in many ways project a cultural world view, computer languages inherently represent an approach to solving a problem. Understanding the paradigms of each language is the first step in successful programming. ■

Charles Jackson is the former Technical Editor of Antic Magazine and Online Editor of Antic Online. He is now a Staff Editor for the Technical Publications division of Excelan Corp. in San Jose, California.

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APL, by Ken Iverson. No longer in print.

The Little Lisper, $12.95. MIT, 55 Hayword Street, Cambridge, MA 02142, (800) 356-0343.

Mindstarms, $8.95, Basic Books (a subdivision of Harper and Row), 10 E. 53rd Street, New York, NY 10022, (800) 424-7734.

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ON DISK

Splines On Splines

Dynamic Motion Control with Cyber Control

BY DANN PARKS

One of the most powerful features of Cyber Control is its ability to define a path in 3D-space and then move an object along that path. These paths are called "splines" and they are the "3D" in three-dimensional computer animation. Splines are not useful just for moving objects around. Cameras, lights, viewpoints and practically anything else you can imagine can be moved along splines. Cyber Control allows complete freedom to create splines and to access the points along them.

The easiest way to move an object along a spline is to use a for/to loop, moving the object to the next point on the spline by using the index variable of the loop (this procedure is explained in great detail in the Cyber Control manual). The number of segments into which a spline is divided controls the speed at which an object moves along it. What's missing in Cyber Control is the ability to control the dynamics of movement along the spline, such as acceleration or slowing to a stop. These motion dynamics are known as "slow-in" and "slow-out" and are essential for creating smooth animations.

Problems with VISITORS

I first ran into this problem doing an animation called VISITORS. It showed a spaceship zooming through a row of columns in a Greek temple. I wanted the ship to slow down and pass between two columns and then stop right in front of the camera. The problem was that there was no way to slow the ship down through the columns, and then the ship stopped very abruptly at the end of the spline.

I had heard of other solutions, such as creating multiple splines end-to-end, each with a different number of divisions. But that still caused unacceptable jerking motions at the transition points between splines. Then I came upon a solution that was simple, flexible and allowed unlimited control of speed, slow-in, slow-out and even reverse.

The secret turned out to be dividing the spline into 1,000 or more segments. Then all I needed was a way to describe the movement of an object—the spaceship in this case—from one of those points to another. The differences between successive moves would then control speed and create acceleration and deceleration.

Goin control over your animations! File SPLINES.ARC on your START disk.

Now, there are probably some fancy mathematical formulas that could generate the numbers I was looking for, but I wanted something that didn't require a degree in calculus and could be done entirely in Cyber Control. I also wanted visual feedback as to what was occurring.

Adding a Second Spline

The solution was to use a second "control" spline, a two-dimensional spline that uses only the x and y positions with the z value held at 0. It starts at a y = 0 position and ends at a y = 1000 position and has the same number of segments as the number of frames in the animation. I then move a "marker" object (a small cube will do) along this spline and use the GRPCENT command to determine the marker's y-coordinate value. After that number is changed to an integer, it's used to place the spaceship on the "movement" spline.

By changing the shape of the control spline, you can alter the dynamics of the spaceship's speed and direction on the movement spline. The ship will still go from one end of the movement spline to the other in the specified number of frames, but *how* it moves is totally controllable.

The control spline and marker actually run right through the middle of the CAD-3D 2.0 universe, but since the marker is never selected for rendering, the whole process is invisible. However, an interactive system for viewing and manipulating the control spline could be developed.

The concept is not as complex as it sounds. Let's look at a few examples. Copy SPLINES.ARC and ARCX.TTP from your START disk to a blank, formatted disk and then follow the directions located elsewhere in this issue to un-ARC SPLINES.ARC. This file contains two Cyber Control programs that will build and run examples of each of these splines (MOVEIT.CTL and BOUNCE.CTL), a spline point file (CONTROL.3D2) and a Cyber Control program that lets you see the effects of changing spline point locations (VIEWSPLN.CTL).

How It Works

Figure 1 is an example of a simple slow-in/slow-out control spline with five control points. As the marker is moved along the spline, the y-position values are closer together at the ends than in the middle, meaning that the object on the movement spline will move slower at the start and end of its travel.

Whether an object accelerates, decelerates, stops or moves smoothly depends upon the orientation of the control spline with respect to the y-axis. When the control spline is *perpendicular* to the y-axis, the object on the movement spline will not move. When the control spline is *parallel* to the y-axis, the object on the movement spline will move at a steady speed. When the control spline changes from perpendicular to parallel, as at the beginning of the spline in *Figure 1*, the object will accelerate. Finally, when the control spline changes from parallel to perpendicular, the object will decelerate.

The control spline in *Figure 2* shows a more complex arrangement. This spline causes the object on the move-

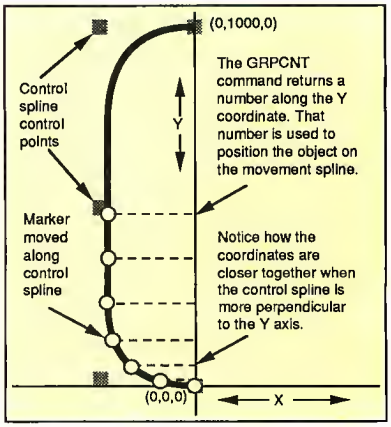

Figure 1. By carefully designing your control spline, you can create all types of object movements. When the control spline changes from perpendicular to parallel, as at the beginning of the spline, the object will accelerate. Conversely, when the control spline changes from parallel to perpendicular, the object will decelerate.

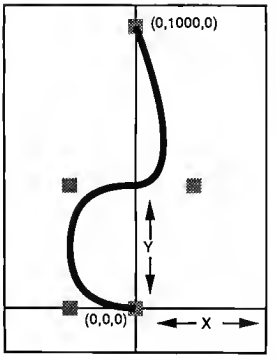

Figure 2. This spline causes the object on the movement spline to accelerate, then slow to a stop, then accelerate again and make an abrupt stop at the end of the spline.

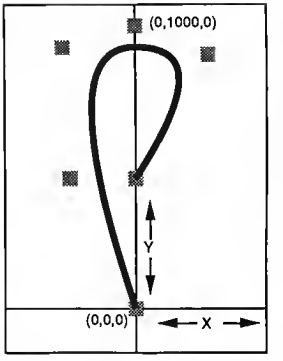

Figure 3. This control spline causes the object on the movement spline to abruptly start and move along the spline, slow to a stop and then backup on the spline to an abrupt stop about halfway along its length.

ment spline to accelerate, then slow to a stop, then accelerate again and make an abrupt stop at the end of the spline.

Any guesses on *Figure 3*? Right, it causes the object on the movement spline to abruptly start and move along the spline, slow to a stop and then backup on the spline to an abrupt stop about halfway along its length. This kind of a movement could be used to make a cartoon car skid to a stop and then snap back.

The solution was to use a second "control" spline.

For the VISITORS animation, I used a version of the *Figure 2* spline, reversed to make the spaceship slow through the columns, accelerate and slow to a stop in front of the camera.

There are two ways to create control splines. You can specify numeric points in a DEFPT command or you can build a series of "control point markers" (little cubes called box1, box2, etc.) and use them to define the spline. This method is explained in detail in the Cyber Control manual. The second method also allows you to change the shape of the control spline in an interactive fashion by manipulating the control point markers in CAD-3D 2.0.

Let's Move It, People!

Let's begin with the program MOVEIT.CTL. You will need CAD-3D version 2.0 or later and Cyber Control to use this and the other programs in this article. MOVEIT.CTL builds animated examples of the movements generated by the control splines in *Figures 1*, 2 and 3. It also lets you load CONTROL.3D2, the control point marker file. These markers can be manipulated in CAD-3D 2.0; VIEWSPLN.CTL lets you view the resultant control spline.

To run MOVEIT, load CAD-3D 2.0 and Cyber Control. Make sure that all four of the un-ARCed files are in the root directory of your A drive and that the watch buffers are enabled. Load MOVEIT.CTL into Cyber Control and click on Run. You'll be prompted to select a control spline. Choices 1, 2 and 3 are examples of the control splines in *Figures 1*, 2 and 3, respectively. Choice 4 will load the CONTROL.3D2 file.

MOVEIT will build a 150K delta animation in the root directory of the A drive, so be sure there's enough room on your disk. Also, each choice will build an animation under its own name, CONTROL1.DLT, CONTROL2.DLT, etc. and each will be about 150K in size.

Ready? Choose 1 and in about 15 minutes you'll have a 60-frame animation ready for viewing in Cyber Paint, Animate, or START's Audio-Video Sequencer (AVS). You'll see a bright red ball moving down a corkscrew-shaped spline. The ball accelerates up to speed and then slows to a stop at the end of its travel; run this animation in ping-pong mode to see this more clearly.

Now try choices 2 and 3 and examine the differences.

The control point markers in the CONTROL.3D2 file are set in the same location as those in choice 1 (*Figure 1*). Load and run VIEWSPLN.CTL to take a look at this control spline.

Peeking at the Control Splines

VIEWSPLN offers several choices. When you first run it, you haven't shown any splines, so enter 1 to clear the splines. You are next asked how many frames (spline points) you will

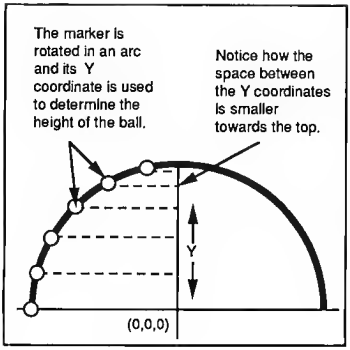

Figure 4. In the BOUNCE animation, a marker is rotated through a 180-degree arc with a 0,0,0 center, instead of using a control spline. The same GRPCENT command is used to produce a y-coordinate, but instead of using the value to determine a location on a spline, it is simply used to indicate the height of the ball above the table.

want to see; to be consistent, enter 60. Next, enter 1 to merge in the CONTROL.3D2 control points. Finally, the "Fit View to Screen" question should be answered 2.

Such subtlety can add a great amount of realism to your animations.

When VIEWSPLN has finished running, you can close the Cyber Control window and click on Superview in CAD-3D 2.0 to study the spline. The spline control points are red and the spline points themselves are blue. Every tenth frame point is white to give you an easy reference.

Now, let's play with it a bit. Enlarge the CAD-3D 2.0 TOP VIEW window to full. The small control point markers, called box1 thru box5, should be visible. You can now move any of the markers to any position. Then open up Cyber Control and run VIEWSPLN again. This time, enter a 2 at the first prompt to keep the earlier spline on the screen and use 60 frames. Be sure to answer 2 to the prompt to use existing points and, again, answer 2 to the Fit View to Screen prompt.

When VIEWSPLN has finished, you can check out the spline created by your new control point arrangement. You'll notice that this time, the control points are blue and the spline points are red, so that you can see the differences easily.

Make It Fit

Depending upon how you set the points, your spline may wander off the visible screen. The Fit view to screen? option sets the camera zoom to insure that all of the control points are visible on the screen. This is the subroutine that accomplishes this:

```
@SETCAM2
group a:allgrp;grpcent x,y,z
bounds minx,miny,minz,maxx,maxy,maxz
z1=int(130000/abs(maxy-miny))
z2=int(130000/abs(maxx-minx))
cam 2 x,y,15000,x,y,z,90
if z1<z2 then zoom z1
if z1>z2 then zoom z2
perspec 0
return
```

The cost of using the Fit View option is that splines will be shown on the screen in different sizes depending upon where you set the control points. The spline dimensions themselves won't change, only their magnification.

If you want to see what effect your modified control spline has on the MOVEIT animation, save the modified CONTROL.3D2 file. Be sure that you have copied the original CONTROL.3D2 to a spare disk or modify the pathname or filename in @CONTROL4 to load your new control point file.

Now, run MOVEIT and enter 4 at the prompt. After a little experimentation with the control point file, you should get a feel for the results produced by various spline shapes.

To use this system in your animations, copy the relevant portions of MOVEIT into your .CTL file. The MOVEIT file is heavily commented and the lines marked with an asterisk are the important ones. It helps to have a pretty good working knowledge of Cyber Control or you can make quite a mess. If you're new to Cyber Control, practice making spline animations without the control splines first.

Still Another Technique

The final file in SPLINES.ARC, BOUNCE.CTL, creates a 30-frame, 50K animation of a ball bouncing on a table. It uses a different application of the same principle to produce the slow-down effect as the ball reaches the top of its travel and accelerates down again.

In this example, instead of using a control spline, a marker is rotated through a 180-degree arc with a 0,0,0 center. The same GRPCENT command is used to produce a y-coordinate, but instead of using the number to indicate a place on a spline, it is simply used to indicate the height of the ball above the table. See *Figure 4*.

As you can see, this is really a simplified double-spline approach. By utilizing the change in the x-coordinate ▶

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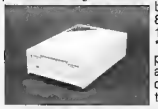

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instead of the y-coordinate, it would produce a slow-in, slow-out effect with no steady-state speed. Also, by moving the marker in a full circle and using the y-coordinate, you could make an object (a spaceship or a hummingbird) bob up and down slightly while hovering. Such subtlety can add a great amount of realism to your animations.

Cyber Control is a very powerful animation language and, as you can see, you don't have to be a math whiz to access the subtleties. It just takes some playing around and thinking of the "what if" possibilities. ■

Dann Parks is the Art Director at KTEH public television in San Jose, California. In addition to using his Atari ST for broadcast animation at the station, he also uses it for MIDI music-making and designing experimental three-wheeled sports cars. The VISITORS animation, an Antic Publishing Hologram Contest winner, and his latest animation, BUZBUZBE, are available in Antic Online on CompuServe (type GO ANTIC).

PRODUCTS MENTIONED

Cyber Studio, including CAD-3D 2.0, $99.95; **Cyber Control**, $89.95; **Cyber Point**, $79.95. Antic Software, 544 2nd Street, San Francisco, CA 94107, (800) 234-7001.

AVS (Audio-Video Sequencer), START November 1988; far disk only, $10.95 plus $4 shipping and handling; far disk and magazine, $14.95 plus $4 shipping and handling. START Back Issues, 544 2nd Street, San Francisco, CA 94107, (800) 234-7001.

MIDI Magic Tape Interface

Who Needs Reel-To-Reel?

BY MARTIN A. MAJANO

MIDI Magic by Micro-W Distributing is a unique tape interface that lets you use any tape recorder to store MIDI data. Connect it to a synthesizer and an inexpensive monophonic cassette recorder and you have a complete MIDI recording and playback system for next to nothing!

For 10 years, I played in a musical group in the San Francisco area and over the years, we recorded five 45's. Before going into the recording studio, we used to tape the rehearsals on a Teac multi-track reel-to-reel. Now, with MIDI Magic, I don't need a multi-track recorder.

MIDI Magic lets you hook up *any* tape recorder (cassette, reel-to-reel or micro) and *any* MIDI device, (keyboard, drum machine, tone generator, computer, etc.) and store your MIDI data on tape. It works with both expensive and inexpensive tape decks and recorders. In fact, I tested it with an old Sanyo tape deck, my sons' portable recorder and a Walkman that I used to play back the MIDI recordings. It really works.

MIDI Magic is a black box about six inches by four inches and weighing about two pounds. It comes with a power supply and all the necessary cables (MIDI In, MIDI Out, Mic In, Aux In, and Ear Out) already attached. Only two of the cables are labeled, however. On top of the box is a reset button to turn the interface on and off, an LED and a switch that lets you toggle between PLAY and RECORD modes. If an error occurs, the LED light goes off. The instructions for MIDI Magic are only five paragraphs long, but that's all you'll need.

Replacing the Multi-Track Recorder

When the group broke up, I decided to buy a drum machine to keep time and rhythm for me while I played my keyboards. I had three at that time, but they weren't MIDI-compatible. That meant that I had to do most of the work when I was playing. Now, thanks to MIDI Magic and a Yamaha PSR70 keyboard, I can store my whole repertoire on a cassette.

One way to do this is to play a song and record it on the keyboard's sequencer. When ready, I can plug in MIDI Magic and transfer the song to cassette. Or I can plug my keyboard into the ST's MIDI ports, boot Legend Soft- ▸

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ware's The Final Cut sequencer program, record and edit my repertoire, then store it on disk. Then, when I plug MIDI Magic into the computer, I can dump my entire repertoire from disk through the sequencer to cassette. It's amazing.

Other Uses

The instructions say that MIDI Magic can turn your MIDI instrument into a player piano. The company is currently converting the QRS Piano Roll Library—over 10,000 songs from 1900 to today—to data tapes that will play on your MIDI instrument. You can also send away for a demo tape; see the end of this article for details.

Theoretically, you could also write a program to store data from floppy disks on tape with MIDI Magic—anyone remember the Atari 410 program recorder? I haven't tested it, but MIDI Magic *could* be used as a tape data backup.

MIDI Magic could also work as a means to exchange MIDI songs between different brands of computers. There's no reason that it wouldn't work—the data is stored on the tape as audio tones, so the brand of computer shouldn't matter.

Does MIDI Magic Work? You bet! Now, when I play at parties, I just take along my keyboard, MIDI Magic, a Walkman and my guitar. I can then sing along to a perfect accompaniment. Play it again, MIDI Magic! ■

Martin Majano is a long-time musician and Atari enthusiast. This is his first article for START.

PRODUCTS MENTIONED

MIDI Magic Tape Interface, $149.95; **Dema Tape**, $10. Micro-W Distributing Inc., 1342B Route 23, Butler, NJ 07405, (201) 838-9027.
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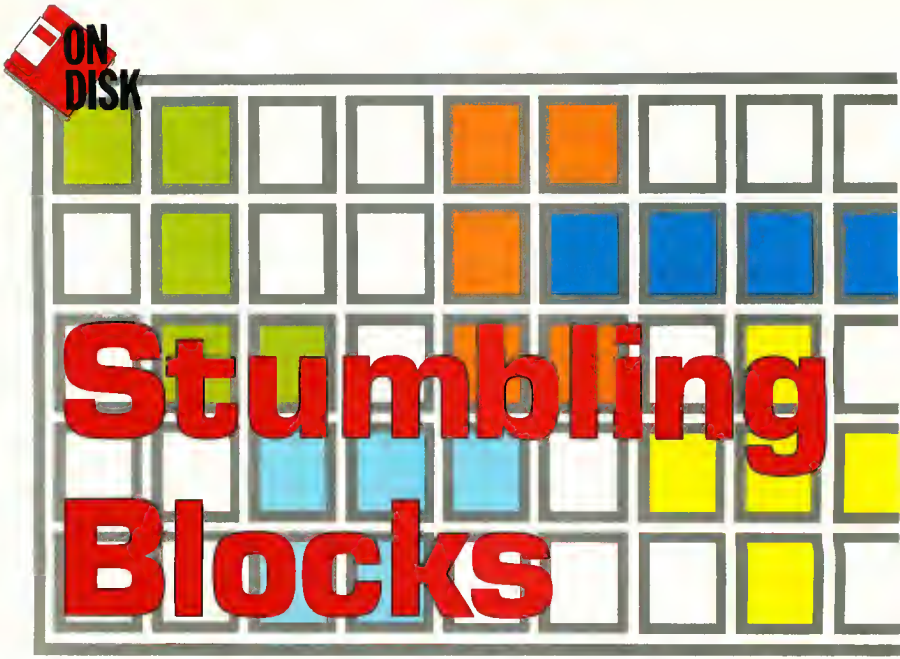


Push Your Puzzling Skills to the Limit

BY MARK ANNETTS

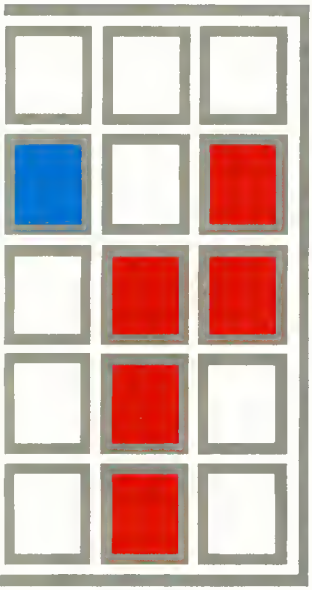
Tired of shoot-em-ups? Try Stumbling Blocks; it's a twist on the old psychological test of fitting square pegs into round holes. Stumbling Blocks is challenging and fun—but not impossible. Written in GFA BASIC 2.0, Stumbling Blocks requires a color monitor.

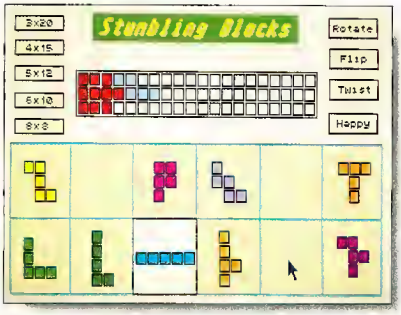
Those bothersome blocks can be found in the files STUMBLE.ARC and STUMBDAT.ARC on your START disk.

If you're a fan of puzzlers like Rubik's Cube and Tetris, you'll easily fall victim to the addictive challenge of Stumbling Blocks. The game presents you with a series of grids into which you must fit a variety of colorful geometric shapes. At first it's *very* easy—the shapes just slide into place like magic. But toward the end of the puzzle you'll find squares that can't possibly be filled . . . or so it will seem.

For Single-Sided Drive Owners

If you have a single-sided drive, you *must* follow these special instructions:





Of the millions of possibilities, there are only two known solutions to the 3-by-20 grid—can you find them (without asking Arthur C. Clarke)?

Format a new disk and label it "Stumbling Blocks". Copy STUMBDAT.ARC and ARCX.TTP onto this disk and un-ARC STUMBDAT.ARC. Now *delete* (drag to the trash can) STUMBDAT.ARC and ARCX.TTP to free up some space on your Stumbling Blocks disk. (Do *not* delete this file from your START disk or START backup disk.)

Now format a second new disk and copy STUMBLE.ARC and ARCX.TTP onto it; un-ARC STUMBLE.ARC. Copy STUMBLE.PRG onto your Stumbling Block disk. This disk should now contain STUMBLE.PRG and Stumbling Block's data files: STUMBLE, STUMGRID, STUMBACK, MASK1, MASK2, SHAPE1, SHAPE2, MED.MSG and HIGH.MSG.

The ASCII GFA BASIC source code for Stumbling Blocks is the file STUMBLE.LST in STUMBLE.ARC. This file will not fit on your Stumbling Blocks disk, but you can view or print it from the Desktop by double-clicking on it; to load it into the GFA BASIC interpreter run GFA, click on Merge and select STUMBLE.LST.

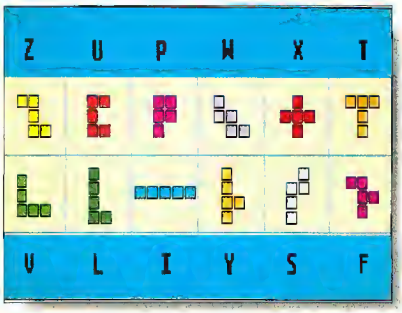
For Double-Sided Drive Owners

If you have a double-sided disk drive, your job is considerably easier; simply format a double-sided disk and copy STUMBDAT.ARC, STUMBLE.ARC and ARCX.TTP onto it. Then un-ARC STUMBDAT.ARC and STUMBLE.ARC, following the Disk Instructions elsewhere in this issue.

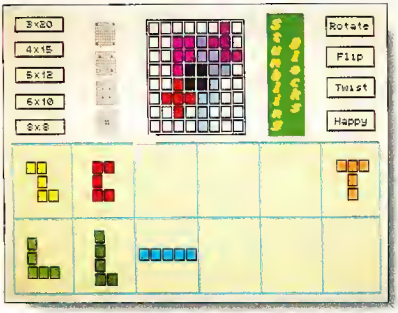
Stumbling Gomeplay

To get stumbling, double-click on STUMBLE.PRG to start the game. Stumbling Blocks runs in low resolution only, but go ahead and try running it in medium or high resolutions—you'll get a kick out of the message you see.

Gameplay in Stumbling Blocks is very simple. At the bottom of the screen are 12 geometric shapes. These shapes make up all the possible combinations of five squares joined together. The object of the game is to fit those 12 shapes ▶



When (or should we say, *if*) you solve Stumbling Blocks, you can print out a letter-coded solution on your printer. The letters correspond to the shapes you placed to solve the puzzle. You wouldn't want to forget how you solved it, would you?



The 8-by-8 grid gives you four extra grids to test your Stumbling Blocks mettle. Or choose the default 8-by-8 grid and you and a friend can play a fascinating game that's as challenging as chess.

perfectly into the grid at the top center of the screen. To do this, click on a shape with the left mouse button and drag it to the grid. You do not have to hold the button down. When the shape is in the desired space, just click again. If you've placed a shape on the grid but later decide that's not where you want it, click on it with the right mouse button and move it to a new spot. To return a piece to the rack at the bottom of the screen, pick it up from the grid by left-clicking on it and then release it (by left-clicking again) anywhere outside the grid.

Stumbling Blocks also lets you manipulate the shapes. To the right of the grid you'll see four boxes: Rotate, Flip, Twist and Happy. Move your cursor to the shape you wish to manipulate and click the right mouse button to highlight that shape. You can then change the shape to your needs.

Click on Rotate to turn the shape 90 degrees in one direction. Click on Flip and your shape flips upside down, while Twist flips the shape from left to right. When the shape looks the way you want it, click on Happy and continue with your puzzle.

The Grids

At the top left corner of the screen, Stumbling Blocks lets you choose your own grid configuration. The choices are 3-by-20, 4-by-15, 5-by-12, 6-by-10 and 8-by-8. The total number of squares in each grid is 60. (The mathematicians among you may have already noted that 8-by-8 equals 64. There's a reason for this, which we'll get to in a moment.) When you click on the grid you want, a dialog box will appear to confirm your choice. Click on DO IT and begin solving your puzzle. To exit Stumbling Blocks and return to the Desktop, press Q.

In my experience, the 3-by-20 grid is by far the most difficult one to solve. Of the millions of possible solutions I know of only two for this particular grid. On the other hand, the 6-by-10 grid has over 2,000 possible solutions. As you can tell, the closer the grid is to a square, the easier the puzzle.

The 8-by-8 grid is a little different. When you choose this grid, you'll see four very small grids along its left side. Each of these grids contain four darkened squares in different configurations. Click on the one you want. The default 8-by-8 grid has no darkened squares.

A Two-Player Game

If you choose to play the 8-by-8 default grid, you'll find at the end that four squares are simply impossible to fill (naturally). No, you haven't found a bug in the program, this is intentional. Without any squares covered, you and a friend can play a fascinating, high-strategy game.

To play the game, you and an opponent take turns placing the shapes on the grid. The winner is the last person to be able to place a shape legitimately on the grid. This apparently simple game has more moves than chess and very quickly becomes brain-achingly complex.

A Record of Your Success

If you successfully complete a grid, Stumbling Blocks will let you make a printout of the screen. As I couldn't do a graphic dump of your solution, due to the many and varied printers on the market, I have used a coded text dump which is easy to understand. Each of the shapes can be identified by capital letters as seen in the accompanying diagram.

Acknowledgements and Even o Hint

Much as I'd love to, I can't claim any original ideas in Stumbling Blocks, except that I brought it to the ST. The concepts used in the game were originally developed by a mathematician named Solomon Golomb. In 1954 he created an entire branch of recreational mathematics he called polyominoes, which were simply squares joined together edge to edge. Thank you, Dr. Golomb.

The actual idea for Stumbling Blocks, however, came from the science-fiction novel *Imperial Earth* by Arthur C. Clarke. In this story Clarke discusses polyominoes and even offers a solution to the elusive 3-by-20 grid. It's a very good book, by the way, and I hope you scout it down to actually *read* it. ■

Mark Annetts is an engineer for the Royal Botanic Gardens in Surrey, England. He is married and has a one-year-old daughter named Charlie. This is his first program for START.

ON DISK

Doing Spreadsheets on the ST, Part II

BY CHRISTOPH L. HERD

Buying or leasing a car? Find out which is best for you with BUYLEASE.ARC on your START disk.

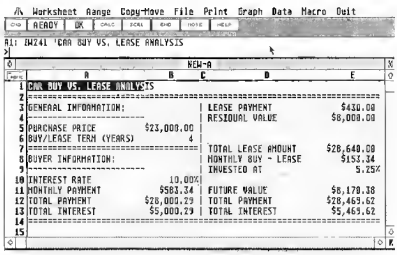


Figure 1: Buy/Lease Statement. This spreadsheet template was produced on LDW Power and is on your START disk in the archive file BUYLEASE.ARC.

In the first installment of this column (START, June 1989) I showed you how to create a spreadsheet to calculate the equity in financed real estate. This time I'll attempt to answer the question, should you buy or lease a car? The information I give here will apply equally to businesses and homes. Listen well; I think you'll learn something here.

Remember that the spreadsheets I cover in this column are on your START disk and can be loaded into any Lotus 1-2-3-compatible program, of which there are now two excellent ones for ST users: LDW Power and VIP Professional. I'll also assume that you have some basic familiarity with spreadsheets.

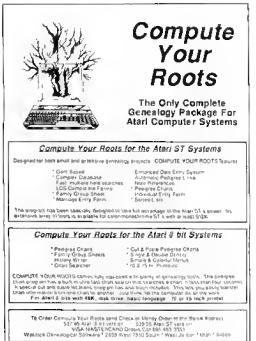
Preparing the Tools

You'll find this month's spreadsheet template on your START disk in the file BUYLEASE.ARC. Copy BUYLEASE.ARC to a blank, formatted disk and un-ARC the file following the Disk Instructions elsewhere in this issue. Remember, you'll need either LDW Power or VIP Professional to load this template. Follow the program's instructions for loading a template file and load BUYLEASE.WKS (Lotus 1-2-3 version 1.0 format).

For those who don't have this month's START disk, load your Lotus-compatible spreadsheet and set the global column width and display format. For most financial spreadsheets you'll want the format of Currency, Two Decimal Places. Note, however, that at this setting, four-digit values become too big for the default column width of nine. Also, analysis of almost anything of value will probably carry you into the four-digit range. Car-loan templates tend to need five-digit numbers (or a column width of 11), while real-estate templates require six-digit values (or a column width of 12).

Lease or Buy?

Let's put this month's template to some practical use. The last time I opened my Sunday paper, out fell the car section, and on the front page an ad proclaimed "Drive our new Model XYZ Super Duper Turbo today for only $430 per month!" "Wow!" I thought. "I wonder how much I would save by leasing it, ▸



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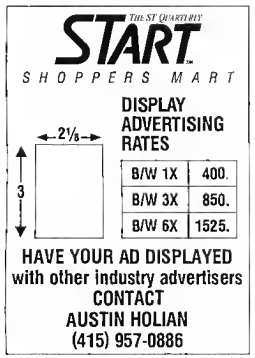

rather than buying it." Upon closer inspection, this is what the small print said: 48 months closed-end lease, MSRP: $23,000, Residual Value: $8000, Monthly Payment: $430.

Let's see what we can do with our spreadsheet (*Figure 1*). This is what the worksheet tells us: Assume you want the car, but wonder if you should lease at the lower payment, or buy outright at the higher financing payment. The purchase price of the car would have been $23,000. You're comparing leasing it for four years, then buying it at the residual value, with financing it to buy with a four-year financing term. Suppose your Credit Union offers you a 10-percent financing rate (cell B10), your monthly payment on the $23,000 loan would then be $583.34. This monthly figure, paid over four years, will result in a total payment of $28,000.29. The total amount of interest paid on the financing is then the difference between the total payment and the cash price. All this information is under General Information and Buyer Information.

The brevity of the spreadsheet does not detract from its usefulness.

So far, so good. Now let's see what leasing will do. The Lease Payment and the Residual Value are in cells E3 and E4, respectively. The Total Lease Payment is nothing but the Lease Term and the Residual Value multiplied by the Lease Payment. The Monthly Buy/Lease amount is the monthly amount you save by leasing: $153.34. Suppose you invested this amount at 5.25-percent interest in a special savings account. At the end of the lease, this account would have grown into $8,170.38, enough to take care of the Residual Value!

Your Total Payment, then, is your Total Lease Amount minus what your savings account earned you above and beyond the Residual Value (or vice versa). Finally, your Total Interest would be the difference between your Total Payment and the Purchase Price of the car, which is $5,469.62. This is the amount you can compare to the Total Interest cost of buying it, which is $5,000.29. As you can see, leasing the car will cost you $469.33 more.

And, Finally . . .

Once again, the brevity of the spreadsheet does not detract from its usefulness. Open your Sunday paper now and experiment with your own figures. If your lease payment is very reasonable, and if your purchasing interest rate is rather high, you may find leasing actually cheaper than buying outright at a financed rate! The only other comment I might make is about the formula in cells A4 and A9, which neatly underlines the text in the cell above. If you change this text, the length of the underlining will be adjusted dynamically. The formula does not underline labels with leading spaces well or cells with non-label content. ■

Christoph L. Herd lives and works in Colorado Springs, Colorado. He is a regular columnist for START.

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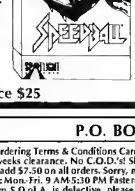

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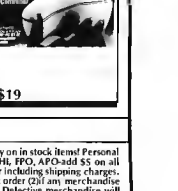

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CIRCLE 042 ON READER SERVICE CARD

Deja Vu II, Captain Fizz, Star Wars

Do you want adventure? Action? Then stay tuned: In this issue veteran gamester Dave Plotkin takes on Deja Vu II, the sequel to Mindscape's popular graphic adventure, and the finally released ST version of Star Wars. If you want a two-player arcade game, follow along as START Editor Andrew Reese leads you through the unique world of Captain Fizz.

Deja Vu II: Lost in Las Vegas, the latest graphic-adventure from Mindscape, sets you in the midst of mobsters and gangland hit men.

DEJA VU II: LOST IN LAS VEGAS

Reviewed By David Plotkin

Deja Vu II: Lost in Las Vegas is a graphic role-playing game in a series that includes Deja Vu and The Uninvited. It has an easy-to-use interface and graphics and animation that are superior even to the other games in this series. However, for a variety of reasons, it's more frustrating to play.

In Deja Vu II, you once again play the role of a second-rate detective (talk about *deja vu*!). In the original Deja Vu, you were accused of murdering Joey Siegel, owner of Joey's Bar. You cleared your name, but now you have a new problem. It seems a large sum of money turned up missing when Joey was killed and the Mob Boss thinks you have it. Your goal is to recover the mobster's missing funds before being rubbed out by a hit man.

You start out in Las Vegas with a throbbing headache and not enough money to get you anywhere useful. A hit man shows up from time to time to either warn you that time is running out—or to let you know that time *has* run out.

Slick Interface

What sets Deja Vu II (and the other adventures in this series) apart from "ordinary" adventure games is the interface. The game is presented through a series of screen windows. The main window in the center of the screen presents your first-person view of the world. You can only see straight ahead, so there is an uncomfortable feeling of stumbling blindly along when moving toward a destination "behind" you or to the ▸

sides. Many objects can be seen in this window, and descriptions of most of them can be attained by double-clicking on an object. Some of these objects can also be added to your inventory.

The Text window describes events and objects you examine. The Exits window shows all exits that are available from your location. To open an exit, double-click on it either in the main window (if it is visible) or in the Exits window. Also, you can double-click on an open exit in either window to go through it. However, if an exit is not visible in the main window, you can only use it from the Exits window.

The Verb window contains a series of action verbs that you can use to interact with your surroundings. Some of the verbs you can choose are OPEN, EXAMINE, HIT and OPERATE. OPEN is very powerful. To load your gun, for example, click on OPEN and then on the picture of the GUN. This opens a new window which shows the contents of the gun. Drag the bullets into that window, then CLOSE the gun. You'll quickly learn that much of your gameplay is done by dragging items between windows!

The Inventory window shows what you are carrying. Items can be picked up from the main window and dragged to the Inventory window. Items in inventory can be rearranged, a great time-saver. For example, there are some newspaper clippings in your wallet, which is in your pants. To get at them you must OPEN your pants, which shows a picture of the wallet (Whew!), then open the wallet. By dragging the clippings from the open Wallet window to the main inventory window, you save a lot of "point and click."

With Deja Vu II's interface you don't have to guess what vocabulary the program understands. You *will* sometimes have a hard time figuring out how to the combine the verbs and objects to achieve the desired result (like putting your pants on). But then, this is part of playing the adventure.

Who's in Control?

Deja Vu II is a moderately funny adventure. If you try something that's silly or doesn't make a lot of sense, the program will respond with an appropriately sarcastic comment. The graphics are decent and most objects are recognizable. Digitized sound, such as car engines and the train conductor's "All Aboard!" add a lot. And the animation sequences are excellent. If you manage to take the required train ride, the countryside rolling by outside the window is very well done.

What sets Deja Vu II apart from "ordinary" adventure games is the interface.

Despite the graphics and sound enhancements in Deja Vu II, I didn't like it as much as I liked Deja Vu and The Uninvited. My impression was that everything in the game must be done in exactly the right order with very few options. You must go to the right locations in the right order or run up against a dead end. In other words, it feels like the program controls *you*, rather than the other way around. Granted, adventure games always control the user to some extent, but Deja Vu II made that fact too obvious.

Another problem I have with the game is that it's too easy to get killed for no good reason. For example, when you go to the train station, there are quite a few possible destinations. But travel *anywhere* other than the right place (and I won't tell you where that is . . .) and the hit man shows up to kill you. On the other hand, the deaf cabbie is a device that works well to keep you on the straight and narrow. You can only go places by showing him printed addresses, so you have to travel to destinations in the correct order.

If you enjoy graphic role-playing adventures, you should give Deja Vu II a look, especially if you've solved the other adventures in this series. But if you haven't seen the original Deja Vu, check it out first. You might like it better.

CAPTAIN FIZZ MEETS THE BLASTER-TRONS

Reviewed By Andrew Reese

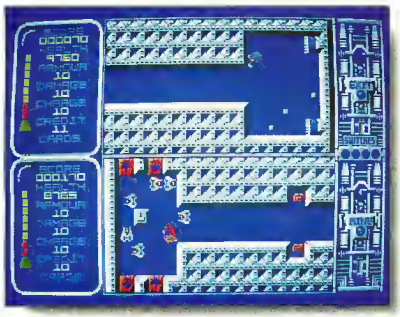
Captain Fizz made me start thinking about the nature of the computer game experience. Is it a solitary pursuit, just you against the computer with its mind-bending puzzles or tests of eye/hand coordination? Is it the chance to take out your aggressions on your buddy by blasting him in a two-player duel? Or can it be more?

Captain Fizz Meets the Blaster-Trons is definitely *more*. It's the first game I've seen that *requires* two players to work together in an arcade situation. As the box copy says, "The message is simple: cooperate or die!"

In some aspects, Captain Fizz seems pedestrian. You play the part of one of the "Queen's Cloned Highlanders," charged with the destruction of an evil central computer after 22 levels of battle. The playfield is viewed from overhead and, while it scrolls nicely as you move from one part of a level to another, the graphics are merely good, not spectacular. But the Fizz screen is split horizontally into two views—one for each player—and this and the game concept makes the difference.

Can't We Be Friends?

Each level is filled with nasty aliens, laser gates, ammo, guns, recharging stations, blocks, tanks, keycards and, I'm sure, other features we haven't seen yet. You need the right color keycard to move through coded doors to complete a level. If your buddy has picked up all of the cards on a level of a particular color, he or she can still help you through a door, but first you'd better work out who does what when, or you're going to die, trapped and alone.



Captain Fizz Meets the Blaster-Trons is different: two players are essential for success and they *must* cooperate in this arcade game from Psygnasis.

Gameplay is fun and within the reactions of the "older" player (me) and yet still fast enough for the younger player (my son). Fizz isn't all action, however. You have to figure out how to turn off the laser gates by setting four switches in the proper order and also decipher the functions of other screen features. Don't look for any help in the meager manual. It's cute and well-written, but virtually useless, since it follows the European prescription for documentation: Don't tell 'em anything they can discover for themselves by trial-and-error.

The Good, the Bad and the Missing

The scoring in Fizz is meaningless, since it doesn't save or even display high scores. The health, armour, damage, charge and credit numbers are nowhere explained and the gameplay usually moves too fast to see what affects them. Fizz uses typical disk copy protection, but it loaded reliably every time. There are a few essential game features like a pause control, two levels of play and a "kill a screenful" blitter bomb, but it sorely lacks a save-game function. It's just too tough a game to complete 22 levels in one sitting.

The message in Captain Fizz is simple: cooperate or die!

It's nice to have a game that teaches some positive values, even if the cooperation necessary in Fizz is directed ultimately to destruction. If you're looking for a game for those late nights alone with your ST, you can have fun with Fizz for a while, but you'll end up frustrated. But if you want to coax a friend into playing a game together, give Fizz a try. In spite of the lack of a few nearly essential features and a decent manual, it's still a great game.

STAR WARS

Reviewed By David Plotkin

If you've been living on this planet anytime during the last 12 years, chances are that you've seen the movie **Star Wars**. Following shortly on the heels of the movie was the arcade game of the same name, which used vector graphics to simulate 3-D very effectively. It was a very playable and very popular game.

Available in Europe for more than a year, Star Wars for the ST has finally been brought to the the United States under the Broderbund banner. Straight off, it's an excellent game with fast action, great graphics and digitized sound. It plays well with both mouse and joystick and there's enough variation in the levels to please everyone from beginner to arcade pro.

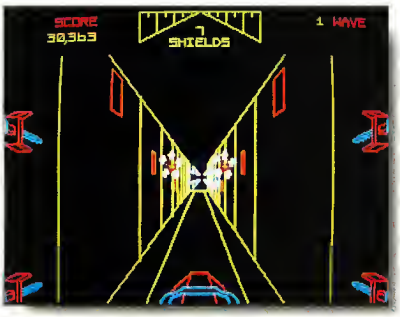
The Game

The game of Star Wars places you near the end of the movie. The Rebel Alliance has launched a strike force of small, one-man fighters to attack the rapidly approaching Death Star. You must destroy the Death Star or the rebel base planet will be destroyed. Your mission is to fly down a long trench in the Death Star's surface and fire an energy torpedo into a small exhaust port at the end. If you're successful, the Death Star's reactor will explode, scattering debris all over the galaxy. If you saw the movie, you'll remember this sequence as one of the most exciting. The game captures this excitement quite well.

Star Wars is played in stages. In the first stage, you're in space, approaching the Death Star. The empire's TIE fighters rise up to meet you, blasting at you with fireballs. Your perspective is from the ▶

cockpit of your fighter. With your lasers, you shoot at either the TIE fighters (which explode after a single hit) or the oncoming fireballs. You can also avoid the fireballs, though it's a little tricky.

Every time a fireball hits you, you lose one of your shields. When the last shield is gone, the game is over. You start the game with a set number of shields, depending on the level you selected, and gain a new shield each time you survive a complete round.



Stars Wars has finally made ta the United States. Braderbund's latest game far the ST faithfully reproduces the arcade hit.

The second stage (which you'll not see at the easiest level) has you flying across the Death Star's surface. Scattered here and there are red blockhouses. These are relatively easy pickings for your lasers, although they do shoot back. In levels three and above, towers are added to the surface. The towers have a white top, and shooting the tops off all the towers gains you a healthy dose of bonus points. The challenge here is not to fly into one of the towers, which are closely spaced. This is difficult toward the end of the sequence, as you are moving very fast. Hitting a tower not only costs you a shield, but also sends your fighter careening out of control for a moment, which may cause you to hit another tower.

In the last stage, your fighter rolls over and dives into the trench. Zooming down the trench, your way is hampered by laser bases that fire at you (level two and above) and barricades across the trench (levels three and above). You can blast the laser bases with your own lasers, but the barricades are indestructible. Avoid them if you can, because hitting one has the same effect as hitting a tower.

If you survive the journey "down the trench," the reactor exhaust port will come into view. Unlike the movie, this port is not hard to hit, and if you blast it successfully, you zoom off into space to watch the Death Star explode. If you miss it, you lose your bonus points and have to make the flight down the trench again.

Outstanding Features

The graphics, sound and control system for Star Wars are outstanding. The game faithfully reproduces the vector-graphics look of the arcade version, and the animation is smooth and fast. When you blast a TIE fighter, it breaks up into little pieces and the various parts go zipping past you. The 3-D effect of flying across the surface of the Death Star is impressive.

The sound is digitized, and sequences from the movie are included. For instance, Obi Wan Kenobi urges you to "use the force" as you fly down the trench. I won't tell you exactly what this means, but there's a bonus for listening to the wise old Jedi.

Star Wars is controllable with both a mouse and a joystick, and the mouse works exceptionally well. It controls the firing cursor and the direction of your fighter, although the fighter can only move in a rather narrow range. Thus, you don't go careening off in the wrong direction if you are concentrating on blowing away that last blockhouse. The mouse tends to be a little confusing when flying down the trench, where you must adjust your altitude to avoid the barricades. I find a joystick is an easier way to fly here, perhaps because of all the hours I've logged on flight simulators.

The combination of action, graphics, sound and playability make Star Wars an exceptional game. From facing Darth Vader's TIE fighter in the opening sequence to Luke telling R2D2 to "see what you can do" with the loose stabilizer, this game pulls you in and makes you part of the Star Wars experience. Now if only I could get a medal from Princess Leia. . . . ■

Andrew Reese is the Editor of START Magazine. David Plotkin is a chemical engineer at Chevron U.S.A. and a contributing editor for START.

PRODUCTS MENTIONED

Deja Vu II: Last in Las Vegas, $49.95. Mindscape, 3444 Dundee Road, Northbrook, IL 60062, (312) 480-7667.
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Captain Fizz Meets the Blaster-Trans, $29.95. Psygnosis, Ltd., P.O. Box 483, Addison, IL 60101, (800) 669-4912.
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Star Wars, $39.95. Broderbund, 17 Paul Drive, San Rafael, CA 94903, (415) 492-3500.
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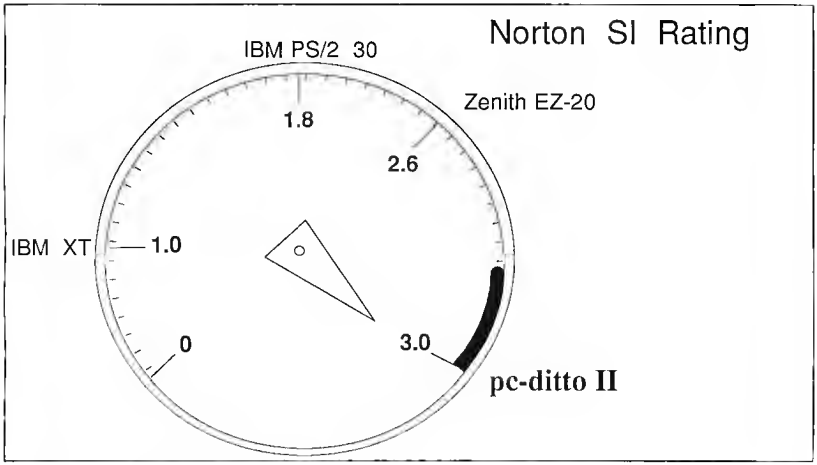

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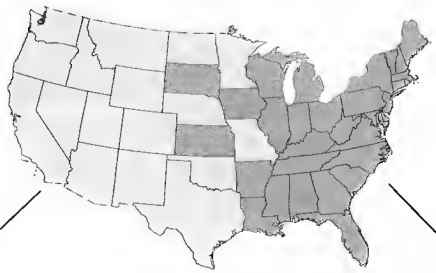

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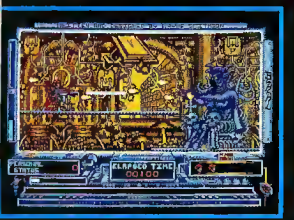

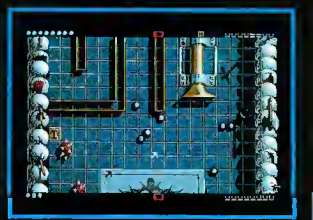

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Can you succeed? There is no option . . . the alternative is literally 'Hell on Earth'.

Screen Shots from the Atari ST version

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CAPTAIN FIZZ
Meets The Blester-Trons

The message is simple: co-operate or die!

It's double fun and double trouble all the way in Captain Fizz, the most exciting simultaneous two-player game you and a friend are ever likely to play. It's a whole new world of split-screen, high-speed action, as both of you take on the nasty Blester-Trons infesting the planet Icarus.

Yup, it's a tough mission alright, but you might just win out with the right blend of co-operation, courage, laser-hot reflexes, tactical sense, . . and brains. The action is fast and furious in Captain Fizz, but if you can't work out the right tactics you'll both be dead meat.

There are 22 levels of savage and relentless action to battle through before you reach your objective, the central computer- that's causing the evil infestation. You'll never get there, though, unless you put your heads together and co-operate; your buddy can't do it on his own, and neither can you. This is one program where even the easy games are hard. So remember — united you stand, but divided you fall. . .

Warning: this game is impossible to beat on your own.

Two joysticks required for two-player game.

Screen shots taken from the Atari ST version

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BALLISTIX
Its a whole new ball game!

Sick of silly old soccer ? Tired of pathetic pinball? Then you need a dose of *Ballistix* - the fastest, wackiest, toughest ball game yet to appear on a computer. *Ballistix* just explodes with excitement, puzzles and an amazing 130 different screens of frenetic action.

The aim of the game is simple; score more goals than your opponent to win the match. Doing it is a different matter as **splitters** fill the screen with dozens of balls, **tunnels** hide them from view, **bumpers** bounce balls all over the show, fiendish **red arrows** speed them up to almost impossible velocity, **magnets** pull them away from your control, and much, much more.

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Ballistix is definitely not a game for wimps. It's tough, fast, challenging and incredibly competitive - in fact, it's just the kind of game you like.

Two joysticks required for two-player game

Screen Shots are from the Amiga version

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